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THE

TRANSACTIONS

OF THE

AMERICAN OTOLOGICAL SOCIETY.

VOLUME III.

1886

1882-1887.

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OF THE

AMERICAN OTOLOGICAL SOCIETY,

FIFTEENTH ANNUAL MEETING.

Lake George, N. Y., July 25, 1882.

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AMERICAN OTOLOGICAL SOCIETY.

The fifteenth Annual Meeting of the American Otological Society was held at the Fort William Henry Hotel, Lake George, N. Y., on Tuesday, July 25, 1882, at 10.30 A. M., the President, Dr. J. Orne Green, in the chair.

The following members were present:—

Drs.	Edwin W. Bartlett	Milwaukee, Wis.
	R. C. Brandeis	New York, N. Y.
	John Green	St. Louis, Mo.
	J. Orne Green	Boston, Mass.
	E. E. Holt	Portland, Me.
	Lucien Howe	Buffalo, N. Y.
	Charles J. Kipp	Newark, N. J.
	Herman Knapp	New York, N. Y.
	Arthur Mathewson	Brooklyn, N. Y.
	Read J. McKay	Wilmington, Del.
	C. S. Merrill	Albany, N. Y.
	H. D. Noyes	New York, N. Y.
	O. D. Pomeroy	New York, N. Y.
	Thomas R. Pooley	New York, N. Y.
	J. S. Prout	Brooklyn, N. Y.
	W. W. Seely	Cincinnati, O.
	S. B. St. John	Hartford, Conn.
	Samuel Theobald	Baltimore, Md.
	J. J. B. Vermyne	New Bedford, Mass.

And by invitation:—

Drs.	W. S. Little	Philadelphia, Pa.
	J. A. Lippincott	Pittsburg, Pa.
	S. Waterman	New York, N. Y.

The President appointed as the Business Committee, Drs. A. Mathewson, E. E. Holt and S. Theobald.

The Treasurer's Report was read and refered to Dr. W. W. Seely, as Auditing Committee.

The President introduced to the Society, Dr. Schultz, of New York, as stenographer, and Drs. Little of Philadelphia, Pa., Lippincott, of Pittsburg, Pa., and Waterman, of New York, N. Y., who were invited to take part in the discussions.

The Committee on Membership made a report, recommending the election of

Dr. Gorham Bacon, of New York, N. Y.,
Dr. George C. Harlan, of Philadelphia, Pa.,
Dr. A. Alt, of St. Louis, Mo.,
Dr. S. C. Ayres, of Cincinnati, O.,

and they were all elected to membership on separate ballots.

The following nominations for membership were presented :—

Dr. W. S. Little, of Philadelphia, Pa.,
Proposed by Drs. John Green and Read J. McKay.
Dr. B. E. Fryer, U. S. A., Fort Leavenworth, Kans.,
Proposed by Drs. H. Knapp and Thomas R. Pooley.
Dr. R. O. Born, of New York, N. Y.,
Proposed by Drs. H. Knapp and Thos. R. Pooley.
Dr. J. A. Lippincott, of Pittsburg, Pa.,
Proposed by Drs. H. D. Noyes and W. W. Seely.
Dr. D. C. Gamble, of St. Louis, Mo.,
Proposed by Drs. C. J. Kipp and J. J. B. Vermyne.

The Auditing Committee stated that the Treasurer's Report was correct, and on motion this Report was accepted and placed on file.

The Business Committee moved that the morning session continue till 1.45 p. m., the hour for the next meeting to be decided at the end of the morning session. Adopted.

It was moved that any paper, requiring more than twenty minutes for its reading shall be presented by abstract, unless the time be extended to a definite amount by a vote of the Society. Adopted.

Also moved that each member, who takes part in the discussions, be requested to put his remarks, as concisely as possible, in writing, immediately after he has spoken, and hand the paper to the Secretary. Adopted.

The Business Committee presented their Bulletin and the papers were taken up in the following order :—

1. Dr. O. D. Pomeroy. Drainage tubes in Suppurative Otitis Media.

Discussed by Drs. Noyes, McKay, J. Orne Green, Seely, Howe, Knapp, Kipp.

2. Dr. A. Mathewson. A case of Abscess of Cerebellum, following Otitis Media, months after apparent cure.

Discussed by Drs. Kipp, J. Orne Green, Pomeroy, Knapp.

3. Dr. C. S. Merrill. A case of Middle Ear Inflammation with *death* on the *fourth* day, from extension of the disease to the brain.

Discussed by Drs. Noyes, Prout, Theobald, Pooley.

4. Dr. Read J. McKay. Aural Polypus—Facial Paralysis, Mastoiditis and Chronic Meningitis, with recovery from the two latter.

5. Dr. E. E. Holt. On "Boilermaker's Deafness" and "Hearing in a noise."

Discussed by Drs. Pomeroy, Kipp, Noyes, Brandeis, J. Green and Theobald.

6. Dr. Samuel Theobald. Complete Closure of both External Auditory Canals, following Chronic Otorrhœa.

After the reading of this paper the Society adjourned till 4 P. M.

Second Session.

The Session was opened by the President, at 4 P. M. The records of the morning Session were read and approved.

The order of the Bulletin was resumed, and the paper read at the morning Session by Dr. Theobald was discussed by Drs. Pooley, J. Orne Green and Kipp.

7. Dr. H. Knapp. The Treatment of Aural Polypi.

Discussed by Drs. Theobald, Pomeroy, J. Green, Kipp, McKay, Brandeis, Pooley, Bartlett, Noyes, Prout, Seely and J. Orne Oreen.

8. Dr. R. C. Brandeis. Exhaustion versus Inflation.

Discussed by Drs. St. John and Mathewson.

Oral communications being called for, Dr. C. J. Kipp spoke of the relation between Deafness and Synchysis Scintillans of the Vitreous.

Discussed by Dr. Knapp.

This communication and the different papers read, with the discussions thereon, were referred to the Committee on Publication.

The Business Committee reported the following list of officers for the ensuing year:—

President	Dr. J. Orne Green.
Vice President	Dr. J. S. Prout.
Secretary and Treasurer	Dr. J. J. B. Vermyne.
Committee on Publication	Dr. J. J. B. Vermyne. Dr. C. J. Blake. Dr. J. Orne Green.
Committee on Membership	Dr. John Green. Dr. H. G. Miller. Dr. C. H. Burnett.

who were all elected on ballot.

It was moved that the next Annual Meeting of the Society be held on the day preceding that of the Ophthalmological Society and at the same place.

The Secretary was allowed to make abstracts from the

proceedings for publication in the American Journal of Otology and the Philadelphia Medical News.

The records of the Second Session were read and approved.

At 6 P. M., the Society adjourned.

J. J. B. VERMYNE,
Secretary.

THE USE OF SOFT INDIA RUBBER DRAINAGE TUBES, IN CHRONIC SUPPURATIVE INFLAMMATION OF THE TYMPANUM, WITH NARROWING OR CLOSURE OF THE MEATUS EXTERNUS.

By Oren D. Pomeroy, M. D., *New York.*

At the N. Y. Foundling Asylum during the past few years I have noticed a tendency in the cases of Chronic Suppurative ear affection in young children, to closure of the meatus externus so as to make treatment of the tympanum difficult and often impossible. To obviate this trouble I have resorted to incision of the canal with the hope of widening it so that the tympanum might be reached by our cleansing processes, and for the purpose of making applications to the tympanum. This has signally failed. Again I have made an incision posteriorly to the auricle, so as to produce an opening with some directness into the typanum. This also has not met with satisfactory success. After a while Dr. E. A. Chadbourne, house physician to the Asylum, suggested and accomplished the introduction of india rubber tubes into the meatus so as to drain away the discharge from the tympanum, and also to allow of applications to be made. This plan has been found to succeed admirably.

The softened, boggy condition of the canal has, by the elastic pressure of the tubing, given away, assuming after a while a natural appearance. The tendency of the canal to discharge, in consequence of the great relaxation of its tissue has been diminished; the ichorous character of the discharge, which often produces grooves in the canal by its corrosive action, is by the rubber tube prevented from doing harm in its passage from the ear. Polypi of the

canal have been absorbed by the pressure of the tube, and altogether its action has been quite satisfactory. I cannot say that I have met with many of these cases in private practice or in that of other Hospitals, but here it is frequently met with. When the tube is inserted the ear may be cleaned very thoroughly by simply syringing through it, and afterwards, if necessary, it may be wiped out with a piece of cotton wool on a probe. After using a tube of a given size for a few days or weeks, a larger one may be substituted, and so on, until the canal has reached its normal size, or until the patient is cured. A rather soft variety of tubing is preferable; the black tubing, which is imported, or the red tubing made here. The ordinary white tubing, made in this country, is usually too hard and inelastic to be useful; it acts as an irritating foreign body and does not exert the peculiar mild and elastic pressure needed. At first the smallest sized tubing, about 2 or 3 lines in diameter, may be selected, as in some cases the canal may be entirely closed. To properly introduce the rubber tube, it must be stretched so as to be diminished to a very narrow diameter, scarcely larger than the probe itself. To effect this, a wire is passed through the tubing, caught on the tube, near its extremity, then pushed onward forcibly, until the tube is scarcely larger than the very small but stiff wire, we have selected. It is then held in that position and gently pushed into the meatus until the tympanum or the remains of the membrane is reached, then with the wire still in position, the tube should no longer be held, when by its elasticity it will assume its normal size and draw itself into the ear, thus restoring nearly, or quite, its normal calibre. The wire is then withdrawn and the tube cut off at the base of the concha. If necessary to withdraw the latter, a pair of forceps will easily accomplish this. After a while it will not be necessary to introduce the tube in this manner, which is somewhat diffi-

cult of performance, but it may simply be pushed into the ear, either with a probe passed through the tube to stiffen it or even without this aid. In very small children I have found that the tube requires to be cut off very short or the patient will catch hold of it and pull it out. In order to treat the granulations and polypi of the tympanum the tube must be removed. After a while the canal will be found large enough to accomplish this purpose. The following cases may serve to illustrate this subject:—

CASE I. Nellie, aged 6 years, has a suppurative inflammation of the left ear, which has continued for four years. Has had most of the infantile diseases, the cause however of the otitis is not precisely known. Has received little benefit from treatment. On April 25th, 1879, her condition was as follows: discharge from the ear profuse and very offensive, meatus so narrow as only to admit the cotton holder, (about 1-2 a line in diameter,) at times it is altogether closed. The auricle, glands of the neck, parts about the ear, together with the connective tissue of the neck in the vicinity of the ear, much swollen. The head is turned to the right, and cannot readily be moved unless with the body. There is a pustular eczema above and behind the auricle, which has produced a number of ulcerated places. A small sized piece of rubber tubing was drawn over the cotton holder and introduced into the meatus as has been described. There was no difficulty in cleansing the ear, through this tube, thoroughly by syringing. Antiseptic and astringent washes were used. Inasmuch as the discharge seemed to excoriate the concha and other parts of the auricle, a mass of carbolized absorbent cotton was placed upon the auricle, and whenever it became at all soaked with the discharge it was replaced by a fresh piece. This plan worked admirably and the auricle rapidly returned to its normal state. After one week the tube was removed; the canal was then about the size of a number 6 gum elastic catheter, and looked very natural; swelling about the ear much diminished, the eczema drying up, discharge from the ear profuse. The tube was replaced without the aid of the probe. After two weeks the tube was again removed, swelling of the parts nearly disappeared, and the discharge much diminished. This was worn until the end of the third week when a larger one was inserted easily. One washing a day was sufficient to keep the ear clean. This treatment was continued for two months, when the child went to the country, wearing the tube in the ear, although the discharge had ceased. After three months the child was returned to the Asylum, still wearing the tube. It seemed to have almost grown into the part, but it was easily removed, and the canal was found to be of normal size and appearance.

Case II. Richard, aged 4 years, previous history unknown, is of a strumous diathesis. April 30th, 1879—Has otitis media suppurativa of R. E. Also suppuration of the mastoid cells. All the tissues and glands about the right ear are very much swollen and œdematous. The right tonsil half fills the fauces, causing gurgling respiration. The external meatus and the side of the neck are ulcerated by the irritation of the discharge. The meatus is almost closed at a point about half an inch from the free border of the canal. The drainage tube was inserted in the same manner as in the first case and the same treatment was pursued. The mastoid cells were opened, and a free discharge of offensive grumous pus followed. At the end of the first week all of the symptoms were improved. The swelling of the ear, neck and tonsil were all diminished. The treatment was continued for four weeks when dead bone was discovered and removed. After this the discharge became gradually less, until it ceased at the end of three months and the tube was dispensed with. There was no recurrence of the disease until fourteen months afterwards, when he had measles. There was a slight discharge for a short time, but no treatment was required; the canal now seems normal.

Case III. Clarence, aged 5 years. Previous history: has had measles, scarlatina and pertussis. Has had suppurative otitis for two years; cause unknown. Has been in one of the Hospitals, and was pronounced incurable, without an operation upon the ear. August 20th, 1879—He is now in very poor condition. Extensive swelling of all of the tissues about the ear. Discharge very fœtid, can touch dead bone with the probe. The meatus externus almost closed, bleeds profusely when touched. The tube was inserted as in the previous cases; it caused considerable pain at first. The discharge was very profuse, the cotton and disinfecting solution being used the same as in case No. 1.

At the end of three days the tube was removed and the canal found to be large enough to allow the removal of several spiculæ of bone with the ear forceps. The tube was easily replaced and allowed to remain for two weeks, when the swelling had nearly disappeared, although the discharge was still profuse, but not offensive. At the end of the third week, more bone was removed and a larger tube was inserted. The ear was cleaned only in the morning. At the end of six weeks the tube was removed, leaving the canal healed and fully as large as normal. There was a slight return of the discharge at intervals for several months.

Case IV. Joseph, aged 4 years. On June 28th, 1879, there was eczema of the right auricle and adjacent parts of the face, neck and scalp.

The lobe of the ear was very œdematous. The meatus was nearly closed from swelling of its walls and excoriated from the discharge. The latter was profuse and offensive. The smallest-sized drainage tube was inserted. In three days the canal had dilated so that the tube fell out; canal healing. Larger tubes were subsequently introduced.

On July 24th the walls of the meatus were healed and the canal was of normal size, discharge nearly subsided and unirritating. The œdema of the eczematous parts had disappeared. Patient discharged.

Case V. Gussie, aged 4 years, otitis media chronica, for the past year. The meatus was of large size and the tube was used to simply protect the parts from irritation. An acute exacerbation was rapidly developing; there were granulations in the meatus. In two weeks the discharge had lost its ichorous character, had become thick and scanty. Tube removed and the walls which had contained granulations were completely healed.

Case VI. Honorine, aged 4. Double otitis media chronica, with an acute exacerbation in the right ear, meatus almost closed. There was eczema of the auricle. with great œdematous swelling. The ear was very painful and bled from the slightest touch in consequence of granulations. The wall of the meatus was excoriated and presented a macerated appearance. The smallest-sized tube was introduced with difficulty. In two days it had dilated the meatus so that it had fallen out. Subsequently larger tubes were introduced until the normal size of the meatus was reached. At first the tubes seemed to cause some pain and the patient would remove them. After six weeks of treatment the patient was cured, the granulations having entirely disappeared.

Case VII. John, aged 3 years. Otitis media suppurative chronica following scarlatina. The meatus of the right ear was one millimeter in diameter only. On June 20th the smallest sized tube was inserted.

The excoriations, which had previously existed in the meatus, healed in three weeks, and the tube was removed in six weeks; discharge slight, canal of normal caliber. Moderate contraction of the canal has since taken place.

The drainage tube has been used in other cases subsequent to these, and in every instance much more prompt recovery has taken place than when other methods have been employed. Gillette, in the Annales des Mal. de L'Oreille, 1879, No. 5, reports the use of a rubber drainage tube which was passed through an opening in the mastoid cells and emerged from the tympanum through the meatus. Schwartze in his mastoid operations uses a rubber drainage tube in the meatus. I fail to find any notice of rubber drainage tubes used precisely as here specified. The mode of action of this tube has been already, perhaps, sufficiently stated.

It is worthy of note that the tube is not perforated as in other rubber drainage tubes. The reason of this is obvious; to protect the meatus absolutely from the ichorous discharge which is the cause of the diffuse inflammation of the canal which leads to narrowing from swelling, consequent on the infiltration of its subcutaneous connective tissue, with inflammatory products, which are principally of a serous nature. The presence of polypi in the canal is easily explained, from the ulceration of the canal consequent on the corrosive action of the discharge.

I believe the canal has its caliber restored more in consequence of the subsidence of the inflammation than from any dilatation afforded by the tube, although the latter factor is not without influence.

There seems no question but that the granulations are removed by the pressure of the tubes acting in accordance with well known laws.

For most of the above cases I am indebted to the former house physician, Dr. Chadbourne, and the present incumbent, Dr. Kortright.

DISCUSSION.

In reply to a question by Dr. Noyes, Dr. Pomeroy said he seldom had any trouble with the stilet in introducing the drainage tube. The stilet should be oiled with vaseline, after which the tube slipped back very readily.

Dr. H. D. Noyes said, in order to meet the want spoken of he one day made a little instrument consisting of two little springs on the end of a stem which acted somewhat on the principle of the corkscrew. He thought Dr. Pomeroy's instrument a very good one, and likely to be of use in many such cases.

Dr. McKay asked if the cases had been followed up with regard to relapses.

Dr. Pomeroy replied that one of the most important facts was that there were decidedly fewer relapses after this mode of treatment than was ordinarily the case. He also remarked that no holes were made in the sides of the drainage tube for the purpose of preventing the discharge from coming in contact with the auditory canal as it passed out.

The President thought this paper suggested a very ingenious method for meeting the three indications which existed in nearly all of these cases, namely, to effect cleanliness, dilatation and pressure. According to his experience at any rate, these were the three indications to be met, and the most important of these was pressure with dilatation. He had for years obtained it by introducing pledgets of absorbent cotton into the canal, of late years soaking the cotton in Price's glycerine, thus gradually opening the canal. But its action was very slow. He certainly thought the gradual but continuous action of the soft rubber tube would be a great improvement for this hopeless, or at least obstinate, set of cases for which it required so long a time to effect a cure. While drainage was a very important element in the treatment, he regarded dilatation with pressure which it produced, equally important for the swollen condition of the tissues.

Dr. Pomeroy remarked with regard to the part played by pressure in the treatment that the benefit which it seemed to effect was in the relief of a condition, which had been set up by the irritating discharges passing through the canal; that the drainage tube removed this discharge entirely, allowing none of it to come in contact with the walls of the canal, and it was to this fact, he thought, that the apparent benefit derived from pressure was chiefly due, and if no pressure whatever were exerted the same result might be obtained. The sponge tent had been used by some to effect dilatation; he regarded his method as certainly much better.

Dr. Seely thought that most of the cases of this affection treated by himself, and by a different method from Dr. Pomeroy's, recovered about as quickly. He simply kept the ear washed out thoroughly, doing it himself once a day, and in some cases twice a day, and if necessary introducing a small pledget of cotton on a probe. He was of opinion that the source of greatest mischief was the irritation caused by the discharges, and that cleanliness was more important than dilatation.

With regard to the matter of time, Dr. Pomeroy said that in these cases every known method of treatment had been tried without success; they had gone on for months, and were finally cured by the method mentioned. It was next to impossible to clean out the canal in the way referred to by Dr. Seely, the opening being scarcely large enough to pass the smallest sized probe. He had not found any such cases in private practice, or in other public institutions than the one referred to.

Dr. Howe said that he fully appreciated the advantages of the method as a means of dilating the canal when contracted as described in the paper. He did not understand how such lateral pressure upon a polypus was any better than the usual methods of treating these growths. Immediate removal certainly produced the desired effect much more rapidly, and, in doing so, we gain also the enlargement of the canal.

Dr. McKay had treated cases of narrowing of the canal either from polypi or from inflammation without polypi for months, and even years, without effecting a cure, and he was of opinion that the rubber tube would be of great benefit in such cases, particularly if the discharge could not find an exit.

Dr. Knapp said that in narrowing of the auditory canal he had employed the rubber tube, and found a great objection to it to be that when the parts swelled, or when a foreign

body was present to act by pressure, the tube became closed. With regard to keeping the walls of the canal free from contact with the irritating discharge, he thought that was imaginary, since, unless the tube were pressed in water-tight, some of the discharge would find its way between the wall of the canal and the tube. In preference to this method he had used properly constructed perforated flexible silver tubes with a flange. They are easily introduced and removed, cleansed and renewed. They may be worn for hours, days or weeks, constantly or with intermissions, according to circumstances.

Dr. Pomeroy replied that he had never seen the rubber tube sufficiently compressed to prevent the freest possible passage of the fluids out, and it was astonishing how easily one could syringe out the cavity of the tympanum through one of the smallest of these tubes. As to the other objection, he believed they were practically water-tight, effectually preventing the discharges from coming in contact with the walls of the canal.

The President remarked that it should be remembered the cases referred to by the author of the paper were old chronic cases, the swelling not being due to an acute process. Such cases he saw sometimes in the hospital. He quite agreed with Dr. Knapp in the opinion that the tube would not prevent the discharges from in the least coming in contact with the wall of the canal. He was still of the opinion that much of the benefit was due to dilatation and pressure, although he quite agreed with the other gentlemen that the original cause of the swollen condition of the canal was due largely to the irritation set up by contact of the discharges. He had used metal tubes in a few cases, but the patients in which this condition was found were mostly of a class that could not be depended upon to return, and he therefore commonly employed pledgets of cotton to dilate the canal.

Dr. Pomeroy asked Dr. Knapp if he did not find solid tubes irritating to the canal. He would naturally suppose they would be so to a greater degree than the rubber tubes, yet in one case in which the rubber tube was used it acted as a foreign body and disturbed the little patient somewhat.

Dr. Knapp replied that they might cause a little disturbance, but they very effectually prevented closure of the canal, and of course retention of pus.

Dr. Kipp had found that, in cases like those spoken of by Dr. Pomeroy, deep longitudinal incisions will remove the swelling of the external canal very speedily.

A CASE OF ABSCESS OF CEREBELLUM FOLLOWING OTITIS MEDIA MONTHS AFTER APPARENT CURE.

By A. Mathewson, M. D., *Brooklyn, N. Y.*

The following case seems to me worthy of record, from the fact of the symptoms preceding the final fatal issue coming on so long after an apparently perfect and permanent cure of the disease of the ear—the ear itself not being affected at the last—and because those symptoms themselves were so slight and uncertain as to render ante-mortem diagnosis difficult, if not impossible.

Mabel K., aged 11 years, a delicate looking child, but of good general health, was brought to me Sept. 12th, 1880, with a suppurative discharge from the left auditory meatus, which was filled with a polypoid mass; an opening over the mastoid surrounded by exuberant granulations and facial paralysis. The probe revealed the presence of dead bone about the mastoid opening. The hearing on the affected side was much diminished, though not abolished. The case had begun with an acute otitis media in the previous June.

Under treatment the discharge from the middle ear ceased, the perforation of the membrana tympani closed, as did the mastoid opening, which was as a measure of safety maintained for a considerable time, and until the carious bone under applications of sulphuric acid was completely removed and healthy granulations appeared. The facial paralysis had meanwhile wholly passed away, and about Dec. 1st, 1880, the case was discharged as having regained as far as possible a normal, healthy condition, and need-

ing no further treatment. The hearing had risen to ten feet for ordinary conversational tones.

There was no indication of the existence of any disease of the ear through the following winter.

On the 14th of March, 1881, I was asked to see the patient in consultation with Dr. C. R. McClellan, the family physician. On the 26th of February she had attended a children's party and was shortly after attacked by vomiting, headache, and other symptoms which seemed due to gastric and hepatic disorder resulting from indiscretion in eating and excitement. What made this diagnosis seem the more reasonable was the fact that before having had any trouble with the ear she had sometimes suffered from gastric and hepatic disorders producing almost identical symptoms. The treatment directed to this supposed condition not having proved effectual, I was called in to assist in determining, if possible, whether the symptoms might not be due to intracranial disease set up by the previous disease of the ear. I found the ear as when last seen, with no sign of any existing disease in it, or in the mastoid. The hearing was as before, ten feet for ordinary conversation. There was no pain complained of in the ear, though there was at times headache, but not of the agonizing character that I have witnessed in most of the cases of intracranial disease resulting from ear trouble which have come under my notice. There were frequent attacks of vomiting, not much fever, or very marked disturbance of the pulse, though the latter was rather slow at times; mental functions little disturbed, and no noticeable derangement of sensation or motion.

The ophthalmoscope showed no swelling of the optic nerve disk, and the retinal vessels were not tortuous, though there was a peculiar dark color with some dilatation of the retinal veins which I shall always hereafter regard with suspicion.

The child was weak and languid, and the skin was sallow.

Fully recognizing the treacherous nature of intracranial diseases having their origin in the middle ear, and the possibility of the existence of such disease in this case, I agreed with Dr. McClellan, who is a most acute observer and accurate reasoner, in thinking that the weight of evidence was on the whole in favor of the supposition of a gastric and hepatic origin of the symptoms presented. A guarded prognosis was given. There was no marked change in her condition till the evening of March 16th, when she died after a brief convulsion.

At the autopsy made on the following day by Dr. B. F. Westbrook, the veins and sinus were found filled with fluid blood, the meninges injected, adhesions at points over the petrous portion of the temporal bone, some small amount of pus under the dura over the tegmen tympani, and in the sheath of the 5th pair; and an abscess containing an ounce or so of fetid pus in the left lobe of the cerebellum. The ventricles were free from pus, though dilated with excess of serum.

Examination of the ear and mastoid revealed no positive signs of present disease of bone or soft parts, except a possible softening of the tegmen tympani.

DISCUSSION.

Dr. Kipp inquired whether the author of the paper had made an ophthalmoscopic examination shortly before the patient's death, to which Dr. Mathewson replied that he did not see the patient soon enough to do so.

Dr. Kipp thought that the value of ophthalmoscopic examination in cases of suppuration of the middle ear was not yet fully appreciated. Since the publication of his paper on this subject, he had seen several cases of puru-

lent otitis media, in which double optic neuritis was present, and, as far as he could remember, death occurred in all of these cases, the operation for perforation of the mastoid having been refused. Although absent in many grave cases of this kind, the presence of optic neuritis must remove all doubt that the brain or its membranes are involved in these cases.

THE PRESIDENT said the paper was an interesting one, especially with reference to the insidious manner in which the brain affection developed long after the aural trouble had apparently been recovered from. He inquired of Dr. Mathewson whether any headache was complained of after the apparent recovery from the ear affection, to which question Dr. Mathewson replied in the negative. The President said that some years ago he reported a somewhat similar case to this society, the patient remaining absolutely well some six months after subsidence of the ear symptoms, with the exception of about a dozen attacks of general headache which he ascribed to impropriety of diet. He had kept some track of the patient on account of the brain symptoms, seeing him about once a month. The last time he heard of him he was asked to write an undertaker's certificate for him. He was told that he had gotten out of bed, feeling unwell; he lay down again, drank a cup of tea, had a severe headache, and in one hour died rather suddenly. No autopsy was obtained, but he always supposed it was a case of rupture of an abscess of the brain. Another interesting point in Dr. Mathewson's case was the fact that there was considerable apparently healthy brain substance between the diseased portion and the bone. This had been a subject of interest to the late Dr. Jackson, pathologist, of Boston, who often asked the explanation of it of persons who had seen such cases.

In reply to Dr. Pomeroy's question, Dr. Mathewson said there had been no elevation of the temperature when he

saw this patient. While in the hospital, during the course of the ear trouble, there appeared to be inflammation of the brain and of the meninges, and they had not the least idea that he would recover. The mastoid was trephined and he performed paracentesis of the membrana tympani and evacuated a lot of pus, and the patient went on to recovery. In reply to a second question by Dr. Pomeroy, he said he regarded symptoms referable to the head in these cases with anxiety.

Dr. Knapp observed that since Dr. Kipp drew the attention to the occurrence of optic neuritis, dependent upon suppurative otitis, he had ophthalmoscopically examined every case of severe otitis purulenta media that had come under his observation. He found that this combined occurrence was quite rare; but in some cases it was very marked and important, as in acute cases of suppuration with internal mastoiditis. It is found more pronounced in the eye of the same side than in the other. After the opening of the mastoid, the retrogression of the optic neuritis went *pari passu* with the progress of the recovery from the ear disease. He related a case in illustration of which he said: When the mastoid was opened, and a large quantity of pus evacuated, a place at the cranial side was found soft on probing.

Dr. Mathewson said that in nearly all of the cases of abscess of the brain which he had seen there was acute, intense pain, and he had come to look upon this symptom as almost pathognomonic. Sometimes it appeared only shortly before death. The pain was continuous and of a tearing nature. One doubt about the present case was due in part to absence of any such pain.

Dr. Knapp could not agree with Dr. Mathewson that this pain was pathognomonic since it was present also in mastoiditis interna, brain symptoms being absent. The fact that it disappeared as soon as the pus found an exit

proved that it was not in that case indicative of abscess of the brain.

Dr. Mathewson said he should have stated that this pain was a general pain of the head, and not limited as in cases of mastoid disease.

Dr. Knapp remarked that in mastoid disease the pain was not over the entire head, but limited to that side only.

The President observed that he had always regarded the more general pain over the head in these cases as a serious symptom, and he was always in the habit of watching such patients closely. The patient usually so described it as to enable one to distinguish it from the pain belonging to the ear. While he regarded it as a serious symptom, he so often found it in patients who got over it that he could regard it only of sufficient importance to demand close watching.

Dr. Mathewson referred to a case in the practice of his friend, Dr. Rushmore, in which there was disease of the left ear followed by abscess in the anterior lobe of the cerebrum on the opposite side, about as far away as could be from the affected ear. While there was no apparent pathological connection, doubtless the abscess was due to the middle ear trouble.

The President spoke of similar cases mentioned in the medical literature.

A CASE OF ACUTE MIDDLE EAR INFLAMMATION, WITH DEATH ON THE FOURTH DAY FROM EXTENSION OF THE DISEASE TO THE BRAIN.

By C. S. Merrill, M. D., *Albany, N. Y.*

Mr. A. P., 32 years of age, first consulted me, at the suggestion of his family physician, Dr. J. M. Bigelow, on the 7th of November, 1877.

He was a book-keeper by occupation, was temperate and regular in his habits of life, and had always enjoyed excellent health, though for two or three weeks he had been a little debilitated from overwork.

He stated that, previous to this, his hearing had always been good and that he had never suffered from any kind of ear trouble.

On the morning of the 7th he for the first time noticed a sense of fullness in right ear and that the hearing was impaired.

He immediately went to his family physician, who sent him to me in consultation.

An examination showed the membrane somewhat congested, otherwise normal. H.D.Rt. 2½″ Lf. 7′.

I Politzerised him two or three times (which increased the H.D. for my watch to 4″) and advised by letter the attending physician to apply a leech to the inner surface of the tragus and a second to the mastoid close behind the auricle and to Politzerise daily.

I neither saw nor heard from the case again till the 10th, three days later, when the family physician came for me to see the patient again with him. I then learned that the

leeching had entirely relieved the condition, so that on the following day all sense of fullness had passed away and the hearing became normal, and he went to his office, contrary to his doctor's advice.

At about five o'clock on the morning of the 9th he was taken with severe pain. Dr. Bigelow was sent for, who administered anodynes and conducted the treatment till I was called in at noon on the 10th, when I found him suffering with a severe meningitis, pulse 160, temperature 103½, respiration 28, delirious most of the time.

The membrana tympani was bulging and greatly inflamed, as were the deeper portions of the auditory canal. A free incision of the membrane, which was unusually thick and firm, evacuated a large amount of pus.

The Eustachian catheter was used, and the air passed freely through the incision.

By noon of the 11th the local inflammation in the ear had greatly subsided; but the meningeal inflammation increased in spite of all treatment, coma supervened and death followed at 6 P. M. on the 11th, four days from the first manifestation of ear symptoms, and three days after the first pain or severe symptom.

A post mortem examination was made 12 hours after death, by Dr. Vanderveer, assisted by Drs. Bigelow, Van Slyke and others.

Concerning the post mortem appearances, Dr. Vanderveer writes me as follows: "On removing skull cap there were evidences of meningitis, and over the region of the petrous portion of bone pus was found.

There had been perforation through the roof of middle ear and underneath the dura mater, and covering the surface of the brain we found a few drops of greenish looking pus.

The perforation of the bone was peculiar, it being of the nature of two or three or more very small openings.

There was not any distinct necrosis. There were all the evidences of acute meningitis."

The temporal bone was excised, and the late Dr. E. R. Hun made a microscopical examination of the inner ear, in which there were no evidences of inflammatory product.

The fatal termination of the case was evidently due to the direct extension of the inflammation to the membranes of the brain through the roof of the middle ear, which in this patient was not a solid plate of bone, but cribriform in appearance.

The case is of special interest in showing how serious these cases of middle ear abscesses are, and how rapidly they may lead to a fatal termination, if neglected or ill-treated.

As far as I am aware, there has never been recorded a case where death followed so soon after the development of inflammatory symptoms in an ear that hitherto had been perfectly healthy.

DISCUSSION.

Dr. H. D. Noyes asked whether there had been vertigo.

Dr. Merrill replied, not so far as was known. He had said the ear was formerly healthy, that is, the patient reported that he had never had any trouble with it, but on performing paracentesis of the drum membrane he found it very thick. The other membrane was not incised. Whether this thickening of the membrane was due to former disease he was unable to say, but it was thought possible that it was a case in which the membrane was very firm, would not break, and that pus may have burrowed upward.

Dr. Prout referred to the proceedings of last year, in which the subject of paracentesis of the drum membrane was discussed, especially in regard to early incisions.

Dr. Theobald thought this was a case in which constitutional treatment might have accomplished a good deal.

Dr. Merrill replied that when he first saw the patient there was no indication for treatment. On the last occasion he saw him after it was too late. He understood that the family physician had given him iodides and bromides internally.

Dr. Theobald thought that if he had had calomel in liberal doses, in addition to the local treatment, he might have stood a chance of recovering which he did not without it. He had in mind a case reported by Dr. Buck, that of a child who was comatose and apparently dying of cerebral involvement, following acute suppurative inflammation of the middle ear. Calomel was given in liberal doses, inunctions of the oleate of mercury were made; the child began to improve at once, and made a complete recovery. Dr. T. had published a case some months ago in which there were certainly symptoms of commencing cerebral trouble; there was great induration and thickening over the mastoid region, the muscles of the neck were swollen and stiffened, and the patient suffered great pain which was continuing to grow worse until he was brought under the influence of mercury, after which all the symptoms rapidly subsided. The cerebral symptoms in this case, however, were not decidedly marked, as they were in Dr. Buck's case.

Dr. Pooley asked Dr. Merrill whether he believed it to be good practice to use the catheter in cases of acute and subacute otitis media.

The President remarked that this seemed to be one of those cases of acute inflammation of the middle ear extending directly to the meninges of the brain. Such cases were rare. According to his experience, the inflammation in such instances started rapidly, and ran, so to speak, a malignant course from the beginning.

AURAL POLYPUS, FACIAL PARALYSIS, MASTOIDITIS AND CHRONIC MENINGITIS, WITH RECOVERY FROM THE TWO LATTER.

By Read J. McKay, M. D., *Wilmington, Del.*

Joseph B., machinist, aged 22 years, born in U. S., called upon me professionally, May 13th, 1881, about "a running" from his left ear, which had lasted seven or eight years, and was due to being struck upon that ear with a boy's fist a week or longer previous to its beginning to pain and discharge. Lately it has bled occasionally. Examination showed a polypus nearly filling meatus, which was at once removed with Blake's snare, and its stump touched with a 2 dr. sol. of argent. nitrat. Local treatment of sol. zinc. sulph. and acid. carbolic. was ordered after syringing ear. Several times weekly he was seen and treated at the office, and greatly improved by the following September, although the removal of the last of the granulation tissue had not been accomplished, as it was found very difficult to do so. An application of a 2 dr. sol. argent nit. seemed to cause considerable pain deep in the ear. For a while he ceased to call to see me, and when he returned, Oct. 25th, he reported that about the first of October he had had an attack of gastric fever, and had been attended at home by his family physician. He has left facial paralysis and has had continual pain in his left ear and left side of head for some weeks, most of the time since he last saw me. He was somewhat relieved by local applications of warm water and 40 gr. sol. argent nitrat. Some weeks later he again called at the suggestion of another family physician who had been attending him for "malarial neuralgia," and had given him quinine freely. He looked very pale and weak, and his left mastoid was swollen and tender. Leeches were ordered, which afforded prompt and great relief, (they were repeated 10 days later). The day after first leeching his temp. was 101° Fahr. and pulse 66. Two

days thereafter his temp. was below normal and remained so for a week or ten days, his pulse ranging from 65 to 56, and he had persistent pain in his head, with such continuous nausea and vomiting that he could not retain nourishment upon his stomach, and at night he manifested slight delirium. About a week he was extremely weak and dangerously ill. Finally, on Nov. 23d, I gave him an hypodermic injection of morphine (gr. $\frac{1}{3}$) which stopped vomiting, relieved the pain, induced sleep, and he began to eat next day, and to improve. For several weeks he was given several injections of morphine daily according to pain in his head. He has been using boracic acid in the ear for several weeks. His temperature continued below normal. Complaining of inability to see well, ophthalmoscopic examination showed well marked left optic neuritis, with considerable congestion of right optic disk. Minute doses (gr. $\frac{1}{10}$) of calomel were given every few hours until slight ptyalism was observed, and this effect was kept up for some weeks. There was a great change for the better in his temperature, general appearance and conversation, about Dec. 14th. His vision improved, and the optic neuritis gradually subsided. He had no longer pain or tenderness about his ear or head, and there was much less swelling of inner extremity of external auditory canal, and less granulation tissue observed. He gradually convalesced and resumed work in March. There still continued slight purulent discharge and some granulation tissue to be seen, which I failed to remove. He is still at work, with a "running" ear, I recently heard. Have not seen him for several months. He still has facial paralysis. (After hearing the discussions on the two preceeding cases I am disposed to think the question arises when optic neuritis is found in these chronic aural cases with the persistent pain usually indicative of meningitis, whether the optic neuritis is due to meningitis alone or meningitis with brain disease?)

BOILER-MAKER'S DEAFNESS AND HEARING IN A NOISE.

By E. Eugene Holt, M. D., *Portland, Me.*

"Boiler-maker's deafness," or loss of hearing from constant concussions of the air produced by striking one substance against another, has been generally alluded to by writers upon diseases of the ear, while "hearing better in a noise" has been referred to by most writers since the time of Thomas Willis, who is said to have made observations upon some persons who only heard in the midst of a noise! Perhaps what I may have to say upon these subjects will hardly be worth the time that may be consumed in presenting it, but as my observations and experiments have led me to entertain views somewhat different from those expressed by others, I have ventured to call your attention to them in this paper. The two subjects have been considered together, because, in examining into the condition of the ears of boiler-makers, it was not infrequently remarked that "I hear better in the noise," or "I used to hear better in the noise before I got so deaf." The basis for the opinion here advanced upon deafness incident to the boiler-maker is founded upon the examination of forty men from the shops for making steam-boilers in Portland, Maine; while what is to be said upon the subject of "hearing better in a noise" is based upon a careful examination of all that have come under my observation who made the claim that a noise improved their hearing, now amounting, in all, to over one hundred cases that have been examined.

The boiler-makers examined were a superior class of intelligent mechanics,[1] who submitted themselves to the

[1]They have a Society—a branch of the "Boiler-maker's Union" which extends over the different States and hold regular meetings for the discussion of questions of mutual interest to themselves.

examination with a good deal of interest. There were forty men examined and the time consumed for each was about twenty-four minutes. The average age was thirty-three years, the youngest being nineteen years and the oldest sixty-two years. As a class they were men of good physique, fourteen being recorded as enjoying good, twenty-four fair, and only two poor health. Most of them used tobacco, there being only nine exceptions, and twenty-four were recorded as chewing and smoking it. With few exceptions the use of alcohol in its several forms was denied, except on special occasions. All drank either tea or coffee strong, and eighteen were recorded as using both. As regards the hearing power, six could hear very loud conversation close to the ear, twenty-eight could hear ordinary loud conversation from four to eight feet, while six claimed they could hear public speaking fairly well. My stop watch, the tick of which should be heard by a normal ear at least two metres, was not heard in either ear, in seven cases; not in the right ear in two cases; and not in the left ear in four cases; while it was heard pressed against, close to, or a few centimetres from, either ear in twenty-three cases. Ten heard it from fifteen to one hundred centimetres from the ear. These were the men who had worked at this employment only for a short time. It was noticed that the deafer ear was always upon the side more exposed to the sound, and this generally was the left ear. Whenever it was found that the left ear was the better one, the answer as to whether the person was not left-handed was generally in the affirmative. This fact has been observed in my private practice, among men in other occupations; for instance, ship mechanics who do the part termed a "calker." I was careful and particular to test each person to ascertain if there were any who could hear the tick of the stop-watch from the mastoid process, temple or other parts of the head, if it could not be heard on

application to the ear. My attention was called to this point by Dr. Knapp, in his paper: "Some Remarks and Observations on Bone Conduction," read before this Society at Newport in 1880, when at that time I was willing to aver that in quite a close observation of five hundred cases of chronic catarrhal otitis media I had observed this fact, although I had not recorded it. I am sure that none of these men could hear the tick of my watch from the mastoid process or other parts of the head if he could not hear it when pressed on the auricle, nor have I observed a case in my private practice that could do so, since my attention has been called to this point, but several of these men could hear the tick of the watch when pressed against the auricle when they could not hear it from the mastoid or temple, and similar cases have occurred in my private practice. A large tuning-fork of the note C was used quite extensively in testing these cases. Its tines were long, so that they could be pressed together by sliding them between the thumb and forefinger, thus obtaining a definite and uniform vibration. When placed vibrating in the centre of the teeth or vertex, the tuning-fork was invariably heard better in what was shown to be the poorer ear. The sound of it was invariably increased by closing the external auditory meatus by pressing on the tragus. The length of time the tuning-fork was heard by bone conduction indicated that the deafness was not due wholly to the effects of the concussions upon the nerve, but that it was principally due to the effects of the occupation upon the conducting apparatus of the ear, since they heard the tuning-fork when placed vibrating in the centre of the teeth, as long or longer than the normal ear, and always longer in the deafer ear for aerial sounds. This would seem to indicate that there was direct bone conduction of sound to the nerve; that the nerve responded to it, and that the deafness was due largely, if not entirely, to an abnormal con-

dition of the conducting apparatus. For if the nerve responds to the tuning-fork by bone conduction in quite a normal degree, why should it not respond to aerial sounds in quite a normal degree, if the conducting apparatus is in a normal condition? It may be replied that the pathological condition of the ear prevented the sound from passing from within outward and reflected it to the nerve so that it was heard longer, and that with this condition of things the nerve might have been impaired and still responded to the tuning-fork, by bone conduction, as long as the normal ear. In answer to this, it may be said that some of these cases heard the tuning-fork as long as many normal ears that have been tested with the meatus closed by pressing on the tragus. In these cases it must be admitted that the deafness, which was very imperfect for ordinary loud conversation, was due to a fault in the conducting apparatus of the ear. The more I examined of these men, the more it was impressed upon me that the impaired hearing was due much more to the condition of the conducting apparatus than to an impairment of the central perceptive apparatus of the ear, and also that there was a direct bone or tissue conduction of sound to the nerve, but whether this only amounts to quantitative perception of sound, as suggested by Dr. Knapp, the writer is not prepared to advance an opinion. There were thirteen cases of inspissated cerumen mixed with the black dust of the shop, the removal of which did not make much change in the hearing power. The membrana tympani showed about the same changes that are observed to have taken place in chronic catarrhal otitis media. The naso-pharynx was invariably in a catarrhal condition. Air was generally very readily passed into the tympanum by self-inflation, showing the Eustachian tube patent in most of the cases. The average length of time that the men had worked at this employment was 13.6 years, the longest being 32 years and the

shortest 1 year. An examination of the eyes of these men was carried on at the same time, to ascertain if their occupation had a corresponding deleterious effect upon the acuity of vision, but aside from those whose eyes had been injured, ten in number, by flying metal, the sight was quite normal. From the tests and observations of all who claimed that they could hear better in the noise, it was evident that conversation as carried on in the shop could be heard better by them than by those who had better or normal ears: but when in testing these cases the voice was used in the same tone as in a quiet place or any of the other tests were employed, they were never heard better in the noise. The results of my tests of those who have made the claim that they could hear better in a noise, has shown me that they were inexact in their observations and labored under a misapprehension of facts, which they were generally willing to admit when shown their error, for without any exception I have never found a person out of more than a hundred examinations that a noise improved the hearing power in the least degree. We find not infrequently in the literature of Otology, reference made to the subject as though it was an established fact that a noise in some unknown way improved the hearing power in certain individuals, but, so far as I am aware, it is not stated that the writer or any one else ever made a careful investigation to ascertain whether the claim of such persons was a real one or not.

There has been no lack of explanations why a person heard better in a noise, but none of them have been generally accepted. The most important point, however, whether it was an actual fact that the noise did improve the hearing power in certain pathological conditions of the ear, as it appears to do, has generally been left out of the question. Von Tröltsch is the only author who raises

this question. He says[1]: "Deaf persons very often tell you of hearing better in the midst of noise and roaring sounds. Misapprehension and lack of proper observation are generally at the basis of these statements." As all my tests have been negative in regard to persons "hearing better in a noise" it occured to me that the apparent phenomenon could be explained by comparing the normal ear with the pathological condition, which is assumed to exist in the ears of persons who make this claim. The external and middle ear collect and conduct the sound waves inward to the internal ear, where they are received and thence transmitted by the nerve to the brain and there interpreted as sound. In examining this remarkable process somewhat in detail, we find that the sound waves are collected, condensed and reflected inward by the auricle through the meatus to the membrana tympani, setting it and the ossicles which are connected with it and one with the other by delicate joints, into a to-and-fro-motion, which movement is communicated through the foot-plate of the stirrup bone to the fluid of the labyrinth where it is received by the terminal filaments of the auditory nerve and thence transmitted inward by that nerve to the sensorium to be interpreted as sound. It is evident then, if this be the normal physiological process of hearing, that when the ear is trying to receive the impressions of particular waves of sound, others causing, or attempting to cause, an additional movement of these ossicles must necessarily interfere with the transmission and reception of the waves of sound listened for, and somewhat confuse the listener, as in fact they do. From the history of repeated attacks of inflammation of the middle ear and naso-pharynx, the pathological condition of the ear under consideration may be assumed to be rigidity of the articulations of the ossicles and secondary tympanic membrane covering the fenestra rotunda, and consequently

[1]Treatise on the Diseases of the Ear, Second Am. Ed. By D. B. St. John Roosa, M. D.

increased resistance to the conduction of sound through the tympanic cavity. This would be a condition of the ear in which more or less of the waves of sound given off in any place would not be received—constituting the deafness—and if more or less of the waves of sound made no impression upon the conducting apparatus of the ear there certainly would not be so much disturbance in such an ear in a noisy place like a boiler-maker's shop, a mill in operation or a railway car in motion, as there would be in the normal ear. The noise producing less disturbance in such an ear and the voice being invariably raised in *a noisy place* the waves of sound produced by it are conducted by the sound transmitting apparatus of the ear to the labyrinth with less confusion than in the normal ear, in which the ossicles must be in a constant to-and-fro-movement or else the innumerable noises would not be heard and there would be no confusion of sounds. Hence it may follow that persons whose ears are in the pathological condition here assumed to be present, may hear conversation as carried on in a noise better than the normal ear, and better than they hear ordinary conversation in a quiet place. But to repeat, when the same tone of voice was adopted in a noisy place that was used in a quiet one, or the tick of the stop-watch, vibrations of the tuning-fork and snap of the finger nails were employed for ascertaining the hearing power they were never heard better in a noisy place, and in most cases not as well as in a quiet one; in other words the noise never improved the hearing power in any case that has come under my observation. In reviewing the results of the examination of the men who are employed in making steam boilers, it is very apparent (1) that all thus engaged become more or less deaf, the degree and length of time elapsing before this occurs depending somewhat upon the tendency of the middle ear to take on catarrhal inflammation, and (2) that the deafness and condition in which

the organ of hearing is found does not differ materially from that of chronic catarrhal otitis media, since it is produced by a similar cause and is due much more to a defect in the conducting apparatus of the ear than to the perceptive part of the same organ; the exciting cause of the deafness being traceable to the constant agitation of the joints of the ossicles, thereby exciting inflammation of these structures and producing more or less anchylosis of them, particularly of the stapes. The question naturally arises: Can this be prevented? The men tell me that they have tried stopping the ears with cotton wool, pads, etc., but have derived no benefit from them. My efforts to devise something to modify the effects of the noise on the ear have not been carried into a practical test yet, but as the examination of the rest of these men goes on I shall hope to make another report upon this point at some future time. An apparatus that would exclude or greatly modify the effects of severe noise on the ear would be useful in many other occupations, and in the centre of large cities, as evidenced by a correspondent to the London Lancet, who says: "In view of the ever increasing noises of the London streets, I venture to ask through your columns, in the interest of those unhappy persons who find it more and more difficult either to sleep well or to work well within the limits of the four-mile radius, why some sort of simple instrument cannot be invented for enabling persons to keep their ears closed (when they wish to do so) in the same way and as effectually as when they apply the tips of their fingers to them? I have tried wool, I have tried the new vulcanite ear-stoppers, but all is useless. Surely it is within the resources of science to solve this difficulty and to confer on nervous and overworked men and women the inestimable boon of 'shutting their ears' as easily as they can shut their eyes."

DISCUSSION.

Dr. Pomeroy asked the author why men working in a noise could not muffle the sound by putting cotton into the ear.

Dr. Holt replied that they complained of its making the ear tender after a time, in some cases causing excoriations.

Dr. Pomeroy considered the paper of great interest and importance, if the observations in it were finally to be accepted as conclusive. He hoped Dr. Holt would continue his investigations and make them manifest to everybody.

In reply to a question by Dr. Kipp, Dr. Holt said he thought the conclusion would be drawn from his paper that all persons working at the same occupation in a noise would finally become more or less deaf, according to the tendency of the middle ear to take on catarrhal inflammation.

Dr. H. D. Noyes had been of the opinion for a long time that the real cause of deafness in this class of persons was due to impairment of the conducting apparatus, and not to impairment of the nervous structure. He had thought that in consequence of thickening and stiffening of the joints in the conducting apparatus these persons required a stronger impulse of air to set the parts in proper motion, in order to produce the necessary impression upon the receptive apparatus. He felt quite prepared to accept Dr. Holt's explanation with regard to this matter. With regard to that part of the paper relating to hearing in a noise, although these persons might not be able to hear really better in a noise than elsewhere, he thought it still remained true that they could hear better in a noise as compared with other persons who were not used to such a noise.

Dr. R. C. Brandeis asked the question: Is there a dis-

ease peculiar to boiler-makers? Is it not also common to almost all laborers, especially those who work in shops, where there is not only a great noise, but also a great draught and change of temperature? And does not this give rise to a nasal catarrh, and to aural trouble by extension of the catarrh up the eustachian tube to the middle ear? He had had considerable experience in this direction, being professionally connected with large iron works, where nearly all the workmen are affected with more or less difficulty of hearing. He had found that such persons were exposed to considerable draught as well as noise, otherwise they could not endure the concussion of the air. and it was to this draught and change of temperature tnat he believed the aural trouble was chiefly due. According to his observation, certain of these persons were really able to hear better in a noise than elsewhere, and he supposed it was due to the fact that the hearing apparatus, had become so modified, so overloaded, as it were, that it required a loud noise or a strong vibration of the air to impress it. Ordinary conversation, without any other noise to produce vibration of the air, would scarcely affect the hearing apparatus at all.

Dr. John Green asked if Dr. Holt had observed whether boiler-maker's, who in the din of the workshops are able to carry on a conversation better than persons not used to such surroundings, have an equal advantage when in the midst of other noises, to which they are comparatively unaccustomed, as for instance in a rail-way carriage. It was quite conceivable that the workmen might simply form the habit of neglecting the special aural impressions made by the continuous hammering, whereas other and less familiar noises would give more trouble.

In weighing the frequently repeated assertion that the hearing of many deaf persons is improved by a din, it must not be forgotten that only loud sounds can be dis-

tinguished at all under such conditions, and that deaf persons may thus easily persuade themselves that their hearing is improved, when in fact they are only recognizing words spoken with deliberation and in an unusually loud voice.

Dr. Theobald said, in testing to determine whether partial deafness was due in certain cases to an affection of the nerve or of the middle ear, placing the tuning fork on, for instance, the vertex, the patient could hear better with the affected ear, but on placing the tuning fork on the forehead he could hear better with the other ear, or *vice versa*; thus leaving him in doubt as to the true nature of the affection. He asked whether any of the members present had had similar experience.

Dr. Pomeroy said that his assistant being unable sometimes to tell which ear the patient could hear best in, he had decided the question in a few minutes by placing the tuning fork to almost every conceivable point of the head, making an average as to which ear he heard best in. He had found no exception to the general rule that where the middle ear was the seat of the disease the patient could hear best by this test on that side.

COMPLETE CLOSURE OF BOTH EXTERNAL AUDITORY CANALS, FOLLOWING CHRONIC OTORRHŒA.

By Samuel Theobald, M. D., *Baltimore, Md.*

Although absence of the external auditory canals, as a congenital defect, (usually associated with malformation of the auricles) is not of extremely rare occurrence, their post-natal obliteration, as a consequence of disease, certainly is. For this reason the following case has seemed worthy of being placed upon record:

Nellie S., 13 years of age, of Irish parentage, had scarlet fever when four years old, which left her with a purulent discharge from each ear. Previous to this time her hearing is said to have been good. After the discharge had existed for several years, "her head broke out"—according to the family report—and the running from the ears ceased, but the partial deafness which followed the scarlet fever persisted. A pain that had just come on in the right ear caused the parents to seek professional advice. The examination instituted revealed a singular state of affairs. Upon each side, instead of the normal auditory canal there was a cul-de-sac, measuring 2 cm. in depth upon the right side and 1.7 cm. upon the left. The auricles were normally developed, and the outer half of the auditory canals presented the usual appearance; instead, however, of reaching to the tympanal membrane each canal terminated abruptly a little beyond the outer extremity of the osseous meatus in a smooth, firm, concave

floor, which was covered with skin continuous with, and similar to that lining the outer portion of the meatus, and which to the probe presented the unyielding resistance of a thick bony septum. Nothing could be learned as to the history of the case beyond the brief details already given, except that the family record was not one to suggest the idea of inherited syphilis. The ear which had been aching since morning, presented no external evidences of inflammation.

Although the hearing was decidedly impaired, the patient was by no means profoundly deaf, but could understand all that was said to her if addressed in somewhat loud tones. With the left ear the watch was heard at 2″; with the right, on contact. With the left, words were understood when spoken with voice raised at 9′; with the right, at 6′. The tuning-fork was heard by each ear, but better by the left. When placed upon the forehead it was heard much louder than when held near the outer extremity of the auditory canal, and in this way too it seemed louder to the left ear. The watch if placed upon the forehead, or upon either temple or mastoid process was heard distinctly. She was not concious of any sensation in the ears when she attempted to inflate the drums by the Valsalva method, nor could I perceive any sound with the otoscope, or any change in the hearing after she had made the attempt. For the pain of which she complained simple remedies were prescribed, and she was told to report on the following day if not relieved; the possibility of improving the hearing by operation was also spoken of—but she did not again make her appearance.

A few days since, having determined to report the case, I hunted up the patient, whom I had not seen for ten years, in order to ascertain what changes had taken place in her condition. She is now a healthy woman, 23 years of age, and unmarried; and her hearing and the condition of her

ears have not materially changed. She can still carry on a conversation very well if the person speaking to her articulates distinctly, and speaks a little louder than in ordinary conversation, and the watch she hears with each ear upon light contact. Inflation by Valsalva's method gave a sound upon the right side as though the air had entered the drum cavity, which the patient heard and which also could be detected through the otoscope. The sensation of bony resistance was felt, as before, upon examining the floor of the cul-de-sac with a probe, and the impression thus obtained that the occluding septum is of osseous character, was confirmed by the loudness with which the tuning fork was heard when brought in contact with a resonant rod one end of which rested upon it. About five years ago an attempt was made to re-open the right auditory canal, but no permanent effect resulted—possibly because she did not continue her visits to the surgeon who undertook the operation.

A case, recently under observation, of partial occlusion of the auditory canals in a girl thirteen years old, who had had otorrhœa from infancy, seems to throw some light upon the etiology of the one just related. Here there existed in each ear, at the outer extremity of the osseous meatus, a collar-like constriction, evidently in part due to periosteal thickening, which so reduced the calibre of the canal at this point, that only a small silver probe could be passed through it; while the deeper portion of the meatus seemed to be abnormally dilated, probably from the pressure exerted by the great quantity of retained pus which was found in it. The chronic circumscribed periositis which was present in this case, as a consequence of the irritant action of the purulent discharge upon the walls of the meatus, doubtless had existed in the other as well, where it brought about the same gradual contraction of the meatus, and ultimately the complete occlusion which has

been described. Perhaps for a time after this occurred the pus formed in the middle ear found a means of escape through the Eustachian tube, but if such was the case it had escaped observation.

Dr. Buck, in his recently published work upon Diseases of the Ear (p. 98) mentions two cases of partial occlusion, and one of total occlusion of the external auditory canal through the development of false membranes, which had come under his observation; in these, however, the occlusion is described as being of membranous, and not of osseous character.

DISCUSSION.

Dr. T. R. Pooley said he reported almost exactly a similar case in the *New York Medical Journal* eight or nine years ago. In this case but one canal was closed, and that one completely so by bone, covered with integument which was freely moveable over the bony obstruction. The patient had had otorrhœa for many years, and this was the final condition. Dr. Pooley was consulted, however, not for the trouble with this ear, but because of inflammation which had extended to the mastoid on the other side, finally terminating fatally.

In reply to Dr. Theobald's question as to whether cases of complete bony closure of both auditory canals are not very rare, Dr. Knapp said they are.

The President recalled a case exactly similar to the one reported by Dr. Pooley, there being complete osseous closure of the canal, covered by skin tissue, and originating in chronic otorrhœa. Partial closure of the canal from hyperostosis he thought was not so rare. He had seen two such cases within a month; in one case the opening being only sufficient to admit the point of a pencil. In both cases there had been chronic otorrhœa for years, one being under observation ten years, during the last two years the

tendency to closure having stopped while the otorrhœa still continues. In this case there was probably disease in the mastoid for which, however, the patient refused to be operated upon. He asked Dr. Knapp if he had not seen such cases of partial bony closure of the canal, and whether he did not regard them as an earlier stage of the affection referred in the paper. Dr. Knapp answered in the affirmative. The President also spoke of a case which he reported some years ago, of a young man, the son of a physician, who had a bony growth within the auditory canal in connection with a discharge which he was unable to stop completely. He went to college, with instructions to return as soon as he had any headache or other suspicious symptoms. The father had refused to allow trephining of the mastoid. About two months later severe head symptoms developed, the patient was delirious. The mastoid was opened with temporary relief, but the patient died.

Dr. Kipp did not think these cases were so very rare. He lately had had one case in which there was complete osseous closure of one auditory canal. He made a crucial incision in the skin and tried to perforate the bony structure with a drill, but failed; the diagnosis however, was confirmed by the incision. Some cases were mentioned in German text books.

The President remarked that the diagnosis in his case was confirmed in the same manner, he having bored into the solid growth.

ON THE TREATMENT OF AURAL POLYPI.

By H. Knapp, M. D., *of New York.*

Mr. President and Gentlemen:—

Every one of you, I suppose, has, like myself, observed that *large* aural polypi are commonly more easily and radically removed than small ones; moreover, that their removal is less frequently followed by relapses. The reason for this apparently paradoxical observation lies in the fact that small polypi commonly have a large ill-defined basis, whereas large ones have a constricted basis, a pedicle. Attempts to remove or destroy small polypi rarely are radical; usually only a part of the little tumor is removed and the remainder thereby stimulated to increased proliferation. The peculiarities in the development of polypi can be much better recognized, when the seat of these little growths is the eye, than when they are located in the depth of the narrow and crooked ear canal. When after a squint operation a stump of tendon is left on the sclerotic and the wound not closed by conjunctival sutures, the conditions for the formation of polypoid excrescences are very favorable. At first the remnant of the tendon and the whole extent of denuded sclerotic are covered with a flat, very vascular and soft elevation of granulation tissue, which in its continued growth overlaps the cornea, produces a muco-purulent secretion, and, without being painful, is quite annoying. To the uninitiated it appears even alarming. In former years, I have not infrequently witnessed that such excrescences were touched with nitrate of silver in substance, which did not destroy, but rather stimulated them to more rapid de-

velopment. In one case I know that after persistent cauterizations the tumor increased so as to cover the whole cornea, protruded beyond the palpebral fissure, and frightened the surgeon so much that he took the eye out, believing that the growth had degenerated into a "fungus." I know that similar treatment with like results has been applied to aural polypi, yet I hasten to restrict my statement by adding that I have never seen an ear taken out.

When conjunctional polypi are left alone, and the eye is kept clean, their basis, as far as my experience goes, invariably contracts into a pedicle, and the tumor is either spontaneously exfoliated, or can be easily snipped off with a pair of scissors. No after treatment is required, the eye is only to be kept clean, and in the course of some weeks or months the episcleral swelling and redness which indicate the former seat of the growth, disappear without leaving a trace.

The experience thus gained on the eye has for many years guided me in handling aural polypi. How easy and satisfactory it is to remove them when they have a pedicle, may be exemplified by a case which I beg leave to relate:

A miner from the West had been suffering from otorrhœa on one side for many years. Off and on he had been treated by different aurists, who "worked at his ear, pulling, crushing, cutting, burning for months at a time." Finally his patience gave out, and he concluded to let his ear alone. For more than a year he did nothing but syringe it when the discharge was abundant and offensive. At last, however, he had become totally deaf in that ear, and suffered from repeated attacks of headache. He had, therefore, made up his mind, he said to me with an ironical smile, to "try Eastern medical talent."

I found the ear filled with a firm polypus which, as I ascertained by probing, had a small attachment in the depth of the canal. I grasped it with Hinton's forceps at its root and at the first attempt drew it out entire and so easily that the man, on seeing it, exclaimed: "It seems, sir, you have been in that pit before."

I syringed the ear, found a large perforation in the drumhead, swelling of the mucous membrane of the drum cavity, but no secondary polypi.

Treatment with a mixture boracic acid powder and alcohol reduced the swelling of the mucous membrane to the normal, stopped the discharge, and reëstablished moderately good hearing (V=20:60). The patient returned home in a month with a perforated drumhead, but no trace of a polypus.

The instruments which I have used for the removal of polypi, are, according to the order of their frequency, Hinton's forceps, Wilde's or Blake's snare, Politzer's ring-knife, O. Wolf's sharp spoon. By preference I use the forceps, because it is simpler and more efficient than the other intruments. In thus adhering to the old method of avulsion, I am well aware how severely it has been critizised. The greatest, in fact, the only objection, raised to it is that sometimes parts of the membrana tympani and the ossicles are drawn out together with the polypus. Nothing of the kind has occurred in my own practice, perhaps because I do not attempt avulsion before a pedicle is formed. The method is considered permissible for polypi originating in the walls of the canal or the tympanic cavity, but not in those that spring from the drumhead and the ossicles. There is no doubt that the enveloping membrane of the ossicles may be the starting point of polypi, but in that case the bone, probably, is carious and partially out of its proper connections, so that its removal may be more an advantage than an injury to the patient. I am not sure whether polypi really originate in the membrana tympani as is asserted. The structure of this membrane resembles so much that of the cornea that I am inclined to believe that the polypus of the membrana tympani exists only in appearance, being in reality a polypus of the drumcavity whose pedicle is surrounded by the regenerated drumhead like a collar, just as the polypus or granuloma of the cornea is in reality a production of the iris. The connection which a polypus forms with the drumhead, is, I think, only frail, and broken without serious injury to the membrane.

I now come to speak of the treatment of smaller polypi

or the roots of the larger ones, as for both the treatment is the same. If, after syringing, I find that one or several polypi are pedunculated, I extract them with the forceps or snare at once, the remainder I treat with *alcohol and boracic acid.* After the propositions of Weber-Leil and Löwenberg I have for years used alcohol pure and alcoholic ear-washes—1 per cent. or 2 per cent. of sulphocarbolate of zinc, nitrate of silver, and the like with equal parts of alcohol and water increasing the strength of the alcohol as I went along—in all conditions of chronic suppurative otitis, and have found that in this way not only the abundance and offensiveness of the discharge is most effectively controlled, but also that the swollen mucous membrane shrinks more than by anything else. My experience, therefore, fully concurs with that of Politzer who lately has spoken with particular emphasis of the advantages of the "alcohol treatment of aural polypi." Since Löwenberg, about a year ago, recommended the combination of impalpable boracic powder dissolved and suspended in alcohol and water, I have used this remedy also for small soft aural polypi and granulations with good results.

A case may serve as an example;

S. E. D.'s son had, in Jan., '81, scarlet fever with a severe attack of tracheal diphtheria (the membranes coming out by emetics). In the 3d week of the disease his ears began to run, and both were completely deaf to all sources of sound. The child recovered. He had a relapse of otorrhœa in the R in May, which soon disappeared, another in June, also of short duration. In the fall he had whooping-cough and the discharge returned again. I found on Oct. 26th, after the removal of the discharge, a polypus the size of a large pea springing from the posterior wall of the tympanum. Boracic acid powder used for a few days had no effect; then I dropped pure alcohol with 1 per cent. of AgO, NO 3 into the ear and had it applied 3 times every day. In three days the discharge was less and the shrinking of the polypus quite noticeable. In a week the polypus was no longer protruding beyond the tympanic cavity, the discharge scant, the *Mt* in proper position on all sides, showing a large but clean hole in the centre; a few days after, the mucous membrane of the drum-cavity was thin but still red; on the 10th of Nov., no discharge, perforation smaller. Jan. 16, '82, ear dry, drumhead restored, HV=20:60, improved by Politzer.

Frequently the alcohol reduces the diffuse swelling of the mucous membrane and contracts the polypi in such a way that they project distinctly and can be easily seized and removed.

The alcohol, as every other substance, is apt to lose its efficacy after uninterrupted employment for one or two months. When by that time the growths have not shrunken or become sufficiently pedunculated to be easily extracted, some other remedy has to be substituted, until either of the two conditions is brought about. After an intermission of a month or longer the alcohol treatment can be resumed. During all this time, which commonly, however, does not last longer than 6 weeks, the ear has to be carefully cleansed and watched lest retention of pus occur.

My experience with the galvano-cautery is too limited to justify any remarks I might venture to make upon it.

The treatment thus far spoken of, i. e., to cause the polypoid growths to shrink by the application of alcohol or other substances, or to prepare them for extraction by letting them grow until they have become pedunculated, and then remove them radically with forceps or snare, will suffice to cure the great majority of these formations. In those that resist this treatment, the underlying bone must be examined for caries, necrosis, and osteophytes. Caries and necrosis require the use of Oscar Wolf's sharp spoon, osteophytes the chisel. I will not occupy your time by also citing examples of these conditions. Some will be found in a report in the next number of the Archives of Otology. My chief object in speaking of the treatment of aural polypi before this society was: 1st, to warn against repeated cauterizations; 2d, to express my experience in favor of the alcohol treatment; 3d, to recommend letting granulations with a broad basis grow until they have become pedunculated, and 4th, to vindicate the old method of avulsion as being both expeditious and efficient, and no more dangerous than other methods.

DISCUSSION.

Dr. Theobald had had no experience with alcohol in these cases, but he had made further use of the mixture spoken of at the last meeting of the society, namely, equal parts of boracic acid and oxide of zinc, and the result had been very satisfactory. The above mixture was thrown into the canal after first thoroughly cleansing it. Two cases were mentioned, in which he removed the polypi, in the one case with the snare and in the other, after breaking the snare, the operation was completed with the forceps. With regard to removing polypi with the forceps, a short time ago after removing the larger of several he grasped a small one with the forceps, situated about midway in the canal, made traction upon it, felt, as it were, a peculiar tearing sound, the patient then tilted his head, and he found he had removed the polypus, but along with it also the malleus and a part of the drumhead. No serious consequence, however, resulted.

Dr. Pomeroy was surprised to hear the author say polypi did not return as a rule. His experience was quite different. He had known them to return when there was not the slightest evidence of dead bone. He would not say he had not for the most part mastered it in the end, but sometimes they returned even as often as a dozen or fifteen times. It mattered not what method had been resorted to for their removal. He was glad to hear Dr. Knapp recommend the forceps in their removal. Formerly he employed the snare, but now used the forceps in preference to any other instrument. One could go in after the polypus from time to time as might be necessary. He had had a little catch placed upon the end of it which the instrument makers called the magic catch, by which tortion could be performed. This forceps could be kept closed without any pressure by the finger. He was not in the

habit of waiting for a pedicle to form before removing the polypus, as that might sometimes require months, during which time there would be a nasty discharge from the ear. He knew the difficulty of removing a jelly-like polypus, but he first applied to it a coagulating solution, as of nitrate of silver or of iron, after which it was friable and might be taken hold of with the forceps and be removed. It was astonishing how much one could sometimes get out at a single sitting. If it bled, some styptic might be applied. The disintegrated portion might again be gone over, scraped off, and the astringent again applied, and so on until all the granulation material, which would certainly develope into a polypus, shall have been removed.

Dr. John Green thought that in proper cases and when executed with reasonable precautions, avulsion was a safe as well as an easy and thorough procedure. The instrument which he preferred was the bent canula forceps of Bumstead, which is in itself a modification of the ring-lever forceps of Toynbee. With his instrument it is often practicable to crush the tissue of a polypus at its pedicle and to bring about a necrosis of the whole polyp. In dealing with the softer polyps he could bear witness to the great benefit accruing from the employment of some agent capable of causing prompt coagulation and shrinkage of the tissue. Such an agent is chromic acid, used either in its solid form or liquified by deliquescence. A minute quantity of the acid may be applied to the most accessible part of the polyp upon the tip of a fine bent probe, thinly covered with cotton. The soft tissue shrinks together where it has been touched by the acid, exposing other portions of the polyp which may be touched in turn until a large part of the growth is destroyed. The quantity of acid used at each application is so small that none of it need come in contact with the walls of the meatus or tympanic cavity. The application is painless.

Dr. Kipp had had similar experience with Dr. Knapp in the use of alcohol. In former years he removed every polypus as soon as he saw it. Now he did not, especially in cases where the granulations grew with great rapidity. In these cases he was formerly accustomed to take off the granulations every day as they appeared, giving the patient a great deal of pain and setting up irritation in the canal. In two or three cases the irritation was extreme, and resulted in almost complete closure of the canal, supposed to be due to manipulation by the instrument. Now-adays he used alcohol, let the granulations grow for a while, perhaps three or four weeks, then took a snare and pulled them out. This, however, related rather to the treatment of cases of granulations than polypi.

In reply to a question by the President, Dr. Knapp said that where the polypus caused retention of pus it called for surgical interference.

Dr. McKay had employed in the case of aural polypus he had reported to the society, beside solution of nitrate of silver, also a saturated solution of boracic acid in alcohol, saturated solution of chromic acid, Wolf's curette, boracic acid in powder and other means, without entirely removing the granulations. He thought the strong solution of nitrate of silver had provoked in his case, an extension of the inflammation to the mastoid and meninges.

Dr. Brandeis thought the leading indication in the treatment of aural polypi was total destruction, and this he believed could be obtained by the galvanic cautery. He was induced to try this method because of the success attending it in the treatment of nasal polypi after all other methods had failed, which success he attributed to a thorough removal of the growth. For the ear he used a reduplication of the platinum wire, beaten out to about a millimeter in diameter and an inch and a half in length, which was attached to

the ordinary cautery holder. After the ear had been thoroughly cleansed and a little vaseline applied about the polypus, the cautery was applied just a moment; if it left a white eschar it was not reapplied for two or three days until this dropped off. His experience with it was limited to two cases, but so far he had reason to be pleased with it. He had used alcohol with varying success, but on the whole he could not say he was enthusiastic over it. He had used boracic acid alone, in solution, and mixed with oxide of zinc, but so long as it remained an acid he had no faith in its therapeutic effects. On himself the boracic acid had not had the least effect in checking the discharge from the ear. He could not believe that it was of efficacy except in the form of boro-glycerine. When used in powder in combination with zinc oxide it is the zinc which exerts the benefit. Glycerine itself is very serviceable owing to its hygroscopic character.

Dr. Pooley thought there was danger in removing polypi with the forceps of setting up an irritation which might result in inflammation extending to the brain. In one case of his own such seemed to be the result of attempts to remove polypus from the tympanic cavity. The patient suffered very severe pain soon after the operation, there was an acute exacerbation of the purulent otitis and death from meningitis.

Dr. Bartlett some years ago learned to apply chemically pure nitric acid to the granulations which sprung up after the removal of these polypi. It was effectual, and easily applied after a little experience, though care was required not to touch the meatus. The pain was very slight. A white eschar was left which slouched away in a few hours, after which the caustic might be applied again if necessary. The after treatment of these cases was very important indeed, else the polypus was sure to return. It consisted in cleanliness, and was carried out by him by

applying Price's glycerine and carbolic acid, ten to twenty per cent. kept in contact with the parts on a pledget of cotton.

Dr. H. D. Noyes said his dependence in the begining of the treatment of aural polypi was upon the method so ably set forth by Dr. Buck and Dr. Blake, namely, mechanical removal. If the polypus were situated in the auditory meatus he thought avulsion was perfectly harmless and judicious, but if it were attached to the tympanum, avulsion was not proper, but an instrument of suitable size should be introduced and the polypus excised, no traction being made. We all knew how Dr. Buck and Dr. Blake had proposed to enter the tympanic cavity through an aperture in the tympanum with the snare, but this was a difficult thing to do, though in all cases not extremely difficult. He found the use of the snare, the least irritating method of procedure in these cases, and he was in the habit of using a very fine one, as fine for instance as a silk thread, which would retain its form sufficiently well to be made to encircle the slightest projection upon the skin surface. When the growth became so sessile that it was impossible to treat it in this manner he resorted to chromic acid. In former years he used nitric acid largely, and sometimes resorted to it at present. It was applied on a probe around which a few strands of cotton had been wrapped; carrying the acid on this it could be applied to the part and all pain relieved in a few minutes by salt water. For sometime past, however, he used chromic acid crystal, applying it on a little probe wrapped with cotton slightly moistened. He had found no difficulty in the destruction of small polypi by this method. Since the last meeting of the society he had been using boracic acid differently from the manner most persons employed it. He found that to blow it into the auditory canal did about as little good as if it were blown into the mouth. The canal and tympanum

should be packed full of the finely powdered acid. He introduced it through a quill, ramming it down with a piston. He had found but one case in which this method had not proved successful, and in that one the discharge was very tenaceous and gelatinous in character, so that the canal could scarcely be cleaned. If the acid could be thoroughly introduced in this case he thought it would effect a cure. Successful treatment depended largely upon a perfect knowledge of the situation of the polypi, and in those cases in which its seat was in the tympanic cavity such knowledge was difficult to obtain. To aid him in the diagnosis in such cases he had for a while back employed an aluminium probe, which, being exceedingly light and bent at the extremity, could be made to explore the tympanic cavity very thoroughly without injury. Here, as said before, a cutting instrument was always used in removing the polypus. He had tried alcohol some years ago, but not meeting with much success he ceased to use it, and had not renewed it, as other methods had proven highly satisfactory.

Dr. Prout had obtained little satisfaction from alcohol. It caused about as much pain as anything else put into the ear. His experience with boracic acid corresponded with that of Dr. Noyes, and the same was true of iodoform and boracic acid, introduced in the same manner. Again, his experience corresponded with Dr. Noyes' with regard to the use of nitrate of silver. He had also used glyceroid of tannin, twenty-five per cent., and he supposed it acted as Dr. Brandeis had suggested, by its hygroscopic qualities, and also somewhat as an astringent. It had worked very well indeed, and was perfectly safe in the hands of the patient who could introduce a few drops once or twice a day after cleansing out the ear. He had also used this in nasal affections. The benefit derived from applications was probably due largely to pressure.

Dr. Pomeroy asked the experience of the society as to the best manner in treating those cases in which the drum membrane was almost intact, perforated only by a very small hole, and a polypus in the tympanic cavity kept up persistent discharge.

Dr. Noyes replied that he would introduce the angular aluminium probe referred to through the little perforation, and with it the origin of the pedicle could be determined; or, by blowing, the patient might blow the polypus through the opening, when it could be seized with the snare and pulled out. If not successful in that, a crystal of chromic acid might be introduced in the manner described. Nitrate of silver might perhaps be used, and an abundance of hot water injected afterward to check pain. This substance, however, caused more pain than any other, and the pain was of an enduring kind.

Dr. Prout suggested the introduction of a saturated solution of bicarbonate of soda on a probe to relieve the pain caused by the nitrate of silver.

Dr. W. W. Seely said it would seem the tendency of the profession to-day in the treatment of aural polypi was less toward operative interference than to general treatment. He was not much in the habit of removing polypi with the snare or forceps, especially in children, unless they were distinctly pedunculated, for the restlessness of the child and the pain the operation caused made it almost impossible to do so. He resorted more commonly to chromic acid, which he had made use of as long ago as sixteen years, before it was spoken of by Dr. Green. He introduced it in crystal on a probe wrapped with cotton. It penetrated deeply, but spread less than nitrate of silver, hence its action is free from danger. Some years ago he treated a large polypus of the nasal passages simply by applications of chromic acid, to see how long it would take to destroy it. It was completely destroyed in three

months, and did not again return. He thought Dr. Pomeroy's experience with regard to the return of polypi in the ear was exceptional. Of late years he did not find the necessity for using even chromic acid as much as formerly, and he believed that operative interference was too common, both in polypi of the nose and of the ear, and much injury was done thereby. Harm was particularly liable to result from the use of nitrate of silver. Much of the benefit supposed to be due to particular applications arose, as Dr. Prout had suggested, from the pressure made, and it mattered less what substance was introduced than that there should be pressure. This was illustrated by a case in which the granulations were exceedingly numerous and in which he simply introduced absorbent cotton greased with half and half mixture of vaseline and boracic acid, cotton being pressed down upon it from without. Four or five days afterwards he removed the plug, and found that the granulations had completely disappeared. He believed boracic acid acted on the principle of pressure alone, and in its use let the canal be filled with it. He used only absolute alcohol, and introduced the boracic acid first. Patients complained but little of the alcohol. The snare should only be used to cut with, but it was very liable to be dragged upon and cause avulsion. This was especially true in children, who were almost certain to make a movement of the head causing avulsion. He was therefore strongly in favor of treating this class of patients by the chromic acid, the boracic acid, the alcohol, or other such simple methods.

The President said it had always seemed to him that the question of the treatment of these polypoid growths of the ear was largely one of otoscopy, of being able to see the exact situation of the growth, and one of manipulation. Inflammation always being the cause of the polypus, if the polypus were removed and inflammation

prevented, the growth would not return. But if the inflammation were not cured, it mattered not how completely the polypus was removed, it would return. He agreed largely with Dr. Noyes in his remarks. He preferred the snare as an instrument for the removal of these growths, but, as with other questions in Otology, it was in no small part a matter of experience or habit as to what instrument one preferred. The necessity for care in the use of the snare was strongly impressed upon him by Dr. Clarke, with whom he saw a case of polypus of the ear in consultation. He wished to remove it with a snare, but Dr. Clarke strongly protested against it, because a patient of his died of meningitis arising, doubtless, from the application of a snare to a polypus which probably was attached to the tympanum. Within the past month he had seen as many as five polypoid growths arising, so far as could be told, directly from the ossicles. The last case was seen a few days ago, and was removed with the snare. It was, almost beyond doubt, attached to the short process of the malleus. He had used the boracic acid and alcohol treatment for two years, and had been very much pleased with the results.

Dr. Knapp said there seemed to be quite a divergence of opinion in the remarks of the members. Dr. Pomeroy did not understand him aright, that these polypi did not recur. That was against all experience. He only meant to say that large polypi when removed recurred much less frequently than small ones. In recommending to let small polypi alone, treating them only with mild remedies, he did so not alone on theoretical grounds, but from a good deal of experience.

EXHAUSTION VERSUS INFLATION

OR RAREFACTION OF AIR IN THE MEATUS IN THE TREATMENT OF SOME OF THE DISEASES OF THE MIDDLE EAR AND MEMBRANA TYMPANI.

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The history of the treatment of diseases of the middle ear may be divided into three parts: First, Valsalva's accidental discovery; second, the application of the Eustachian catheter; and third, the invention and introduction of Politzer's apparatus. Since the last, little or no progress has been made in the treatment of diseases of the Eustachian tube, of the tympanic cavity, and of the drum-head. It is my purpose to lay before you, for consideration, a method, which, though not new, has in many cases yielded me very satisfactory results. I allude to the therapeutic employment of Siegle's pneumatic speculum. With few exceptions, this instrument, has so far, been used only for diagnostic purposes in order to determine the mobility of the drum-head or to demonstrate the existence and nature of adhesions to the inner wall of the tympanic cavity.

It occurred to me, some six years ago, while treating a case of otitis media hypertrophica, with stricture and occlusion of the Eustachian tube, that this method might be utilized for therapeutic purposes, in order to relieve labyrinthine pressure. The success attending this procedure was so marked that I felt myself justified in examining further into its mode of action.

The direction which the Eustachian tube takes from its

pharyngeal opening to its termination in the tympanic cavity is backwards, upwards and outwards. It forms an angle of 40° with the horizon and one of 135° with the axis of the external auditory canal. The membrana tympani, in its normal condition, is also inclined at an angle of about 45° in its vertical plane and at an angle of 10° either to the right or left, as the case may be, in its horizontal plane. If a current of air be driven into the tympanic cavity, its greatest force must impinge upon the upper and outer walls of the tympanum and upon the posterior, superior quadrants of the drum membrane. A part of the current plays upon the central portions of the membrana tympani and the remaining force is exerted upon the ossicles and the tympanic cavity. We thus find that a great part of the pressure employed to relieve the various diseases affecting the middle ear and drum head, is useless, and, in many cases, does more harm than good.

The objections to the use of Valsalva's method are manifold. In the first place, the force exerted in injecting the current into the tube and middle ear, admits of no gradation. The patient strains and strains until the lips and walls of the tube have separated, and the entire current of air—whose quantity is only limited by the size of the lungs and the upper respiratory tract—is allowed full entrance. When the resistance of the tubal wall and the pressure exerted by the external atmosphere upon the drum head is once overcome, then the current of air rushes in with undiminished force and penetrates every part of the cavity and mastoid cells. In acute affections this may even cause rupture of the membrane, aside from the great hyperæmia and shock which, almost invariably ensues. The drum-head may be replaced, it is true, but how long does it take before it again assumes its abnormal position? The improvement in hearing, if any, is but transitory; since the cause of the deafness—the obstruction to the free cir-

culation of air through the Eustachian tube—still obtains. In acute catarrhal otitis, the Valsalvan act may even increase the difficulty of hearing by forcing the accumulated mucus, in the tubes and drum cavity, upon the ossicles and membrane, thereby increasing the impairment of mobility and impeding the transmission of sound waves. In many instances in which Valsalva's act has been resorted to, I have noticed an increase of the tinnitus as well as decided vertigo. This can only be due to the air ruseing in with such violence that the stapes is forced into the oval window; in in this way increasing the intra-labyrinthine pressure. Continued employment of this method, as has been repeatedly urged, may bring about another condition which interferes greatly with the acuity of hearing, namely, a flaccidity of the membrana tympani, which subjects it to postural changes with every variation in the external or internal atmospheric pressure.

I would not undertake to say, however, that this method of inflation may not afford great benefit when employed for diagnostic purposes. But as a method of treatment it should be entirely discarded.

The use of the Eustachian catheter for inflation of the middle ear is also attended with disadvantages. But these need not be so great as in the method just considered. In many cases, owing to thickenng of the mucous membrane, to hypertrophies of the turbinated bones or to deviations of the septum narium its introduction is attended with difficulties sometimes so great that the tubal orifices cannot be reached at all. This inability to insert the catheter properly may also be due to changes in the topography of the naso-pharynx which sometimes supervenes upon chronic catarrhal conditions or when neoplasms have developed. In the hands of inexperienced manipulators the pressure applied to the catheter during inflation may also lacerate the lips of the tubes, causing

hæmorrhage into the naso-pharynx and into the tubes and tympanum. If care be not taken, inflammatory processes may set in which may cause cicatrization and stenosis of the canal. Another disadvantage consists in the difficulty in determining the degree of the pressure to be employed in compressing the air bag. This is sometimes so great that more harm than good is done. I have endeavored to obviate, in part, the two last difficulties by employing a modification of an old method which has fallen into abeyance owing to sad abuse. I mean the use of compressed air.

In using the Eustachian catheter in my private practice, I proceed in the following manner: The catheter is placed in position, the nose grasped between the third and ring fingers of the left hand; the catheter firmly fixed by means of the thumb and index finger. The auscultating tube being adjusted, I insert the nozzle of the tube, which is in connection with the receiver containing compressed air, into the mouth of the catheter and pressing down the check spring allow the air to pass through the catheter, into the middle ear, with gradually increasing force, until the requisite pressure is obtained. I have the check spring under perfect control and can diminish or increase the force of the current at will. In this manner inflation can be performed with the utmost satisfaction, and the catheter remains absolutely immobile. In order to determine the exact pressure exerted it might be well to insert a manometer somewhere along the continuity of the rubber tube, although this can also be learned from the guage which is attached to the receiver. By means of this device I have been able to mitigate some of the disadvantages attending the use of the catheter, but the great difficulty, the exact determination as to what part or parts the greatest force of the current of air should be directed, still remains.

The use of Politzer's air bag is now almost universal.

I do not wish to detract from the merits of the device, nor am I disposed to enter into a consideration of the various modifications: whether deglutition or the enunciation of "hic" or "hack" contributes most to its perfect performance, but I must say it has its drawbacks as well as either of the other procedures. In many cases it cannot be used with any satisfaction whatever. This is especially the case with children, who often cannot acquire the knack of swallowing at the proper moment, and if they do, are as apt to discharge the water into the operator's face as to force it downwards into the stomach. Even though this act be properly performed, the forcible compression of the air bag is followed by such a violent entrance of air into the ear, that the patient may be so greatly alarmed as to decline any further treatment. The shock is little less than that produced by Valsalva's act, and the immediate result generally consists in an increased difficulty of hearing owing to the violent displacement of the ossicles and the drum membrane. This gradually lessens as the parts regain their wonted position and the excessive quantity of air escapes through the Eustachian tubes or is absorbed by the mastoid cells.

I have done away with some of these objections by employing a device which consists of a hard rubber tube, fitted into a bottle, by means of which I can inject any volatile substance into the ear and which is attached to the same tube that is used for the catheter. I can, in this way, regulate the quantity of air injected and have also a check upon the pressure employed.

There are many cases of disease of the middle ear that do not yield at all to any of the methods which have been considered. The imperviousness of the tubes and the consequent collapse of the membranes may have endured for so long a time that stenosis and adhesion have developed. The contractions of the muscles may have become perma-

nent and the circulation of the cavity and drum head so much impaired that treatment, from within, affords but little benefit.

When the air contained in the tympanic cavity is compressed the drum-head is driven outwards, but the change of position is greater in the membrana flacçida than in the anterior, inferior portion of the membrane. The position of the ossicles is also changed but the malleus and incus alone are driven outwards, while the stapes, on the other hand, more closely approaches the vestibule. This has been demonstrated by Prof. Politzer[1] who made a number of experiments which go to prove that, "by compressing the air contained in the tympanum we not only have a change in the tension of the membrana tympani, but owing to the influence exerted at the same time upon the membrane of the foramen rotundum and upon the movable plate of the stapes the pressure exercised upon the fluids contained in the labyrinth is materially increased". He also found that if the stapedio-incudal joint is divided, the height of the column of fluid contained in a manometric tube, which is inserted into the superior semi-circular canal, will be increased from ½-1mm. in consequence of the neutralization of the resistance which was exerted by this joint by the simultaneous movement outward of the membrana tympani as well as of the hammer and anvil, this preventing a further protraction of the stapes into the vestibule.

Jos. Gruber[2] has also called attention to this state of affairs which could be explained in part by the peculiar and complicated mechanism of the chain of bones.

The increased pressure upon the intra-labyrinthine fluids as intensifies the difficulty of hearing as well as the attending tinnitus that in some cases vertigo and even nausea

1Diseases of the Ear. Stuttgart, 1878, Vol. I. page 79.

2Ueber Verdichtung und Verdünnung der Luft in dem Gehörorgan als Heilmittel bei Ohren Krankheiten. Wiener Allgemeine Med. Zeit Nos. I and II, 1881.

and vomiting may ensue. Rarefaction if properly applied, on the contrary, draws the stapes as well as the other bones out, and, by relieving the labyrinth of the excessive pressure and diminishing the hyperæmia, will certainly lessen the symptoms if it does not cause them to subside altogether. The beneficial effects attributed to the use of collodion in retracted drum-heads and tinnitus can be referred to a similiar action produced by the exhaustion of air from the meatus. Meniere's symptoms are also greatly relieved by a systematic application of suction.

In cases where there is a permanent or temporary deficiency of the drum-head and an accumulation of mucus or pus, or both, in the tympanum, careful suction will almost invariably succeed in removing the fluids and that from parts which can hardly be reached by pipettes.

In 1878, Dr. Woakes[1] published a series of papers in which he recommended the systematic exhaustion of air from the external meatus. To do this satisfactorily he devised an apparatus which he named the "pneumatic tractor." This consists of three parts,—a pear-shaped bell, which is connected with an exhausting syringe, and an ear-piece. This bell is attached to the syringe and the air exhausted; the stop-cock is then turned, the syringe detached and the ear-piece adjusted. This is now introduced into the meatus and the stop-cock opened so that the air contained in the canal can be exhausted. Traction is maintained for eight or ten seconds and the air is then allowed to rush in through a small opening in the ear-piece. The apparatus can now be removed. By reversing the action of the syringe compression of air can be brought about.

Prof. Gruber[2] employs the following apparatus: an ear-piece, which can be accurately fitted into the meatus, has a rubber tube, about 50 cm. in length attached to it and

1 On Deafness, Giddiness and Noises in the Head. Lancet, 1878.
2 Loc. citat.

this is again fastened to an ordinary rubber air-bag. If suction is to be employed, the air-bag is compressed, by the right hand, so that all the air is driven out. The ear-piece is then introduced into the meatus and the pressure on the bag removed. Owing to its natural elasticity this will gradually refill, thus exhausting the air that is contained in the meatus. If it is deemed best to apply compression, the air-bag is allowed to fill, and pressure is then applied by means of hand and fingers.

The objectionable features of both these methods are manifest. In the first place, we are always working in the dark and, secondly, we cannot determine whether the force employed is not greater than need be. In Dr. Woakes' hands I have repeatedly observed rupture of the membrana tympani, which he considers rather beneficial than otherwise. If this is to be done, I think it would be better to do it under careful observation, because the force employed might also be sufficient to cause a serious displacement of the chain of bones, not to speak of the great hyperæmia and even hæmorrhage which must follow. It is also difficult to guage the exact amount of force employed, especially when using Gruber's apparatus. In inexperienced hands it may happen that the chain of bones as well as the membrana tympani is separated from its attachments and serious consequences ensue.

I am in the habit of using an ordinary Siegle's pneumatic speculum which has a piece of rubber tubing passed over the ear piece so that it can be acurately fitted into the meatus. The speculum has a rubber tube, about a foot long attached to it on one end while the other is fastened to a suction syringe capable of containing about a cubic inch of air. The piston of the syringe works by means of a rachet so that it can be withdrawn to any desired extent and will then remain in position until a change is needed.

The speculum is introduced by means of the thumb and

index finger of the left hand while the auricle is drawn upwards and backwards by the third and index fingers, so that the canal is straightened and the drum-head brought into view. The light of the reflector is now thrown into the meatus through the oblique piece of glass inserted into the speculum. The syringe is held in the right hand and the piston worked up and down with the thumb alone. The movements of the drum head are under perfect control and the exhaustion can be suspended at any moment, without incurring the slightest risk. If instead of suction, pressure is to be employed, the piston of the syringe can be withdrawn before the speculum is adjusted and it can then be be driven home at discretion. By moving the speculum up or down, or backwards or forwards, the spot on which the greatest degree of force is to be directed, can be brought into view with great ease. How long this force is is to be allowed to act depends, in part, upon the appearance of the drum-head and the handle of the malleus, which become very hyperæmic, and also by the sensation experienced by the patient. As soon as there is the slightest pain further manipulation should cease.

In a number of cases I have combined this with other modes of treatment. In marked retraction of the drum-heads, due either to stenosis of the Eustachian tubes or to anchylosis of the ossicles or contraction of the muscles, I first inflate by means of the catheter; if this cause any increase of deafness or fullness of the head, I apply suction and soon remove these symptoms. I also employ this method after the removal of inspissated cerumen where the force of the current of water injected gives rise to unpleasant sensations.

In some cases, after having replaced the drum-head as near its normal position as possible, I also apply collodion, which assists in keeping the parts fixed.

So far I have never observed any injurious results which

could be attributed to the exhaustion of air while on the other hand the benefit has been sufficiently great to induce me to study the modus operandi more thoroughly.

Without claiming any extravagant merits for this mode of treatment I think that it is an addition to the means we now have at command for the relief of a numerous class of cases and I recommend it to you for favorable consideration and careful trial.

DISCUSSION.

Dr. St. John, some five or six years ago, had used an instrument almost identical with that described by the author. He thought he derived a good deal of benefit from its use in causing some exercise, though limited, of the drum membrane and of the ossicles. It seemed to him there was a somewhat similar condition between these small joints in cases of chronic aural catarrh that we find in the larger joints of the body in cases of chronic rheumatism, and motion, he thought, both on theoretical grounds and from experience, was of benefit.

Dr. Mathewson said that Dr. Howard Pinkney, of New York, had published a paper some years ago in the Medical Record in which he had described the use of Siegle's speculum attached to an ordinary stomach pump, for application of suction and pressure on the membrana tympani in diseases of the middle ear and he had seen it applied by Dr. Pinkney in his clinic at the New York Eye and Ear Infirmary.

VERBAL COMMUNICATIONS.

Dr. C. J. Kipp made the following verbal communication:

In a number of cases of sparkling synchysis he had found deafness more or less complete in one or both ears. In one patient the deafness was on the same side as the synchysis; in another the synchysis was confined to one eye while there was deafness in both ears, greatest however in the ear of the side corresponding to the synchysis; in still another case there was synchysis of both eyes and deafness of both ears. He was unable to explain the connection between the eye and ear trouble, if any existed. He asked for the experience of the society in regard to this matter.

Dr. Knapp thought Dr. Kipp's cases showed a somewhat remarkable combination of occurrences. He had not observed deafness in connection with the cases of synchysis which had fallen under his notice. Such had also been the experience of Dr. John Green, of St. Louis.

TRANSACTIONS

OF THE

AMERICAN OTOLOGICAL SOCIETY,

SIXTEENTH ANNUAL MEETING.

Hotel Kaaterskill, Catskill Mountains, July 17, 1883.

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OF THE

AMERICAN OTOLOGICAL SOCIETY.

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Dr. J. J. B. Vermyne, ... New Bedford, Mass.
Dr. David Webster, ... New York, N. Y.
Dr. E. Williams, ... Cincinnati, O.

AMERICAN OTOLOGICAL SOCIETY.

The Sixteenth Annual Meeting of the American Otological Society was held at Hotel Kaaterskill, Catskill Mountains, N. Y., on Tuesday, July 17th, 1883. The Society was called to order at 10.30 A. M., by the Vice-President, Dr. J. S. Prout, of Brooklyn, N. Y.

Dr. Prout congratulated the Society on its prosperity, and the goodly number of members present, and expressed his regret that the President, Dr. J. Orne Green, of Boston, could not be present on account of sickness in his family.

The following members were present:

Drs. J. A. Andrews,	Stapleton, St. Isl., N. Y.
E. A. Bartlett,	Milwaukee, Wis.
Ch. H. Burnett,	Philadelphia, Pa.
W. H. Carmalt,	New Haven, Conn.
E. Dyer,	Newport, R. I.
John Green,	St. Louis, Mo.
Emil Gruening,	New York, N. Y.
E. E. Holt,	Portland, Me.
S. J. Jones,	Chicago, Ill.
Ch. J. Kipp,	Newark, N. J.
H. Knapp,	New York, N. Y.
Wm. S. Little,	Philadelphia, Pa.
F. B. Loring,	Washington, D. C.
R. J. McKay,	Wilmington, Del.
C. S. Merrill,	Albany, N. Y.
H. D. Noyes,	New York, N. Y.
J. S. Prout,	Brooklyn, N. Y.
W. W. Seely,	Cincinnati, O.

Drs. S. Sexton, ... New York, N. Y.
G. Strawbridge, ... Philadelphia, Pa.
S. Theobald, ... Baltimore, Md.
J. J. B. Vermyne, ... New Bedford, Mass.
David Webster, ... New York, N. Y.

And by invitation:

Drs. J. Andrew, ... Philadelphia, Pa.
L. W. Fox, ... Philadelphia, Pa.
Russell Murdoch, ... Baltimore, Md.
R. H. Johnson, ... Philadelphia, Pa.
H. W. Williams, ... Boston, Mass.
S. M. Burnett, ... Washington, D. C.

The President appointed as the Business Committee, Drs. E. Dyer, E. A. Bartlett and F. B. Loring.

The Chairman of the Committee on Membership stated that Dr. H. G. Miller, one of the members of that Committee, was unavoidably absent, and requested that some member be appointed in his place to act on this Committee during the present session. The chair appointed Dr. E. Dyer.

The Treasurer's report was read and referred to Dr. G. Strawbridge, as Auditing Committee, who subsequently reported that he had examined the accounts and the vouchers and found them correct. The report was accepted and the Committee discharged.

The President introduced to the Society Drs. Andrew and Fox, of Philadelphia, who were invited to take part in the discussions.

The Committee on Membership made a report, recommending the election of:

Dr. B. E. Fryer, U. S. A., Fort Leavenworth, Kans.
Dr. R. O. Born, New York, N. Y.
Dr. Wm. S. Little, Philadelphia, Pa.
Dr. J. A. Lippincott, Pittsburg, Pa.

and they were all elected to membership on separate ballots.

The Business Committee announced that the titles of thirteen papers had been received, eight of which took precedence in the order of publication in the formal call of the meeting.

1. Dr. W. W. Seely, of Cincinnati, O. A case of Primary Epithelioma of the Auricle. Removal of the entire Auricle by Thermo-Cautery.

It was discussed by Dr. Knapp.

2. Dr. J. A. Andrews, Stapleton, St. Isl., N. Y. On the Intermittent Perception of Sound, as conveyed through the Air and the Cranial Bones, with a brief Summary of the Results of Treatment in Chronic Aural Affections with Impaired Hearing.

Read by title and referred to the Publishing Committtee.

3. Dr. J. A. Andrews. The Recognition of Brain Complication in Aural Affections.

Discussed by Drs. Kipp, Seely, Knapp, Strawbridge, McKay, Bartlett and Sexton. The chair remarked that on the bulletin appear the titles of three papers on Mastoid Disease, and as the discussions have largely drifted toward the subject of Brain Complication in Mastoid Disease, he called for the reading of these papers, in order to have them discussed in connection with Dr. Andrews' paper.

4. Dr. Sexton, New York, N. Y. External and Internal Inflammation of the Mastoid, with cases.

Read by title and referred to the Publishing Committee.

5. Dr. R. J. McKay, Wilmington, Del. Acute Desquamative Inflammation of the External Auditory Canal, Acute Otitis Media, Mastoiditis and Chronic Meningitis. Recovery.

6. Dr. C. H. Burnett, Philadelphia, Pa. A case of Mastoid Disease; Artificial Perforation of the Bone. Temporary relief. Death from Pyæmia.

The discussion was now continued, and was participated

in by Drs. Strawbridge, Knapp, Sexton, Theobald, Kipp, Bartlett, Jones, Holt and Prout.

The Business Committee moved that the Society have an executive session at 1.45 P. M., and adjourn at 2.30 P. M.

7. Dr. E. E. Holt, Portland, Me. Teratoid Tumor of each Lobe. Seventh Recurrence with Diagrams.

The Committee on Membership proposed the following resolution which was unanimously adopted:

Resolved, that whenever a candidate is proposed for membership, both the proposer and seconder shall furnish letters to the Chairman of the Committee on Membership, setting forth the claims of such candidate for membership.

At 2.30 P. M. the Society adjourned till 7.30 P. M.

Second Session.

The Society was called to order at 7.30 P. M. Drs. Murdoch of Baltimore, H. W. Williams of Boston, R. H. Johnson of Philadelphia, and S. M. Burnett of Washington, were introduced by the chair and invited to take part in the discussions.

Dr. John Green introduced a motion to amend Art. 1 of the By-Laws, by adding after the words "had been received" the words "and at the same meeting." Laid over till the next session.

Dr. Sexton continued some remarks on Mastoid Disease, showing a former patient, now one of the waiters at the hotel, who had recovered under the use of Calcium Sulphide.

Remarks upon this case were made by Drs. Gruening, Kipp, Theobald, Burnett, Webster, Bartlett.

The order of the bulletin was then resumed.

8. Dr. E. E. Holt, Portland, Me. Observations on the hearing power in different conditions.

9. Dr. Ch. J. Kipp, Newark, N. J. On the Associa-

tion of Aural Diseases with simple Sparkling Synchisis of the Vitreous Humor.

Discussed by Drs. Little, Webster and Knapp.

10. Dr. C. A. Todd, St. Louis, Mo. Anomolous Sebaceous Gland in Immediate Proximity to the Auricle.

On account of Dr. Todd's absence, his paper was read by title and referred to the Publishing Committee.

11. Dr. S. Sexton, New York, N. Y. The Significance of the Transmission of Sound to the Ear through the Tissues in Aural Diseases.

Discussed by Drs. Burnett, Holt, Andrews and Kipp.

12. Dr. S. Sexton. Exhibition of Photographs, illustrating Cases of Aural Diseases.

Exhibition of two Syringes to be used by the patients themselves, and of a hooked Curette for the removal of foreign bodies.

Remarks were made by Drs. Knapp, Prout and Webster.

13. Dr. H. Knapp, New York, N. Y. An obstinate case of Desquamative Otitis Media finally cured.

Discussed by Drs. Theobald, Sexton, Jones, Little, McKay and Merrill.

At 10.15 P. M. the Society took a recess for five minutes.

Third Session.

The Society met in executive session at 10.20 P. M.

The amendment to the By-Laws proposed in the preceding session was discussed by Drs. Jones, Dyer and Green.

Dr. Jones moved the following as a substitute for the amendment: to insert after the words "has been received," the words "and either at the same or next meeting," and after the word "Society," which ends the paragraph, the words "and such name shall be carried upon the list of

candidates as hereinafter provided, to be sent to every member of the Society."

This substitute was adopted by the Society, and then the Article as amended was accepted.

The Business Committee reported the following list of officers for the ensuing year:

President, ...	DR. CH. BURNETT, Philadelphia, Pa.
Vice President, ...	DR. J. S. PROUT, Brooklyn, N. Y.
Secretary and Treasurer . .	DR. J. J. B. VERMYNE, New Bedford, Mass.
Committee on Publication, .	DR. J. J. B. VERMYNE. DR. C. J. BLAKE. DR. J. ORNE GREEN.
Committee on Membership, .	DR. JOHN GREEN. DR. H. G. MILLER. DR. A. MATHEWSON.

These officers were all elected on ballot.

The Business Committee further moved that the next Annual Meeting of the Society be held the day before that of the Ophthalmological Society and at the same place, and that the Otological Society would respectfully recommend Newport, R. I., to the consideration of the committee of the Ophthalmological Society, to which this question should be referred. Adopted.

The records of the different sessions were then read and approved.

At 11.30 P. M. the Society adjourned.

J. J. B. VERMYNE,

Secretary.

REPORT OF A CASE OF TERATOID TUMOR OF BOTH AURICLES, HAVING A CLINICAL HISTORY OF A RECURRENT FIBROID.

By E. Eugene Holt, M. D., *Portland, Me.*

The following history of morbid growths occurring upon the ears of a young woman is of unusual interest in several respects:

1. They promptly followed perforation of the lobe and wearing of gold ear-rings.

2. They have repeatedly recurred during a period extending over twenty years.

3. They have undergone remarkable change in structure.

Mrs. R——, 29 years of age, light complexion, and of good, average health. Father and mother both living, the former aged 64 and the latter 60.

The mother's history is good. The father's history is one of more or less poor health and for many years he has had a sore upon his cheek which has spread and extended towards the nose. This sore has been pronounced to be cancerous by some and has been treated by both "regulars" and "irregulars" in various ways. During the last year or so he has been under treatment at the Long Island Hospital and has taken medicine for his blood, which has completely cured the cancer (?) if we believe all that is said regarding both the diagnosis and the cure.

A sister of Mrs. R—— once had a small growth come upon the lobe of one of her ears which her mother cut off

with a razor. In proof of the utility of this impromptu surgery, it is said that the growth never returned.

When the subject of this history was about eight years old, she had her ears pierced and wore small gold ear-rings for a short time.

Soon after she began wearing the ear-rings a small nodule came upon the lower margin of the lobe of each ear. After these growths had attained a little size, her mother cut them off with a razor and the parts soon healed. In a few months there was a recurrence of the growths, and they were allowed to grow until they attained some considerable size. When the patient was about 12 years old, she passed under the care of Dr. Ripley of New York who operated upon both ears.

Soon after the operation there was a recurrence of the growths, and, after about three years, she went to an Eye and Ear Infirmary in New York, and again had them removed.

Between two and three years after this third removal, they had recurred again and were of sufficient size to require another operation and she went to the same institution.

The fourth operation was followed by recurrence, and, in a little over two years, the patient was again operated upon by Dr. Ripley.

Thus the patient has been operated upon every two or three years up till four years ago, and the tumor removed each time was as large as or larger than the end of a man's thumb. As near as she can remember, she has had seven operations. The recurring tumors have usually appeared within a few weeks after each operation.

In the early part of her history the tumors began on the lower margin of the lobe and extended downwards half an inch or so upon her cheeks, but latterly they have shown an inclination to extend upwards along the margin of the

helix. In every instance the tumors have been about the same size upon each ear. At the time of their last removal they had an attachment upon the helix over an inch in length.

About a year ago the patient came under the care of Dr. Charles R. Crandall, of Portland, Maine. When seen by him, the tumor upon each ear was about an inch and a quarter long, and an inch or more across and ovoidal in shape. They were of a purplish shade, appeared quite vascular upon the surface, and, to the touch, yielded a sensation peculiar to dense, fibrous tissue. They were painless, and it may be said that these growths, as they have recurred from time to time, have never been painful.

The patient was advised by Dr. Crandall to submit to an operation at once, but she had become disgusted with such procedures and preferred to wait.

A year passed away, and in the meantime the tumors grew rapidly, and attained the size of a small hen's egg. Moreover, the tumor on one ear began to get sore, and oozed a whitish gelatinous substance. Under pressure this substance would ooze more freely, and seemed to come from the interior.

Finally on the 12th of March, 1883, she submitted to an operation which was performed by Dr. Crandall and myself.

In performing this operation we excised the tumors and all suspicious tissue well up to, and, at some points into, the outer margin of the anti-helix. The tissue of the anti-helix lying between the anterior and posterior layer of skin was then dissected out as well as could be and the edges of skin brought into nice apposition, by a great many fine cat-gut and horse-hair sutures. As a result, upon one ear there was union by first intention throughout, whilst upon the other there was both primary and secondary healing.

Since the operation, now nearly four months, there have been no indications of recurrence.

As an adjunct to the above history I will quote from a recent letter by Dr. J. H. Ripley of New York, bearing upon this case.

"I suppose the patient referred to by you was Miss E— before marriage, and if so, I first removed a small fibroid from the lobe of each ear about fifteen years ago. I have since removed recurrent growths from her ears once or twice and they have been removed once, I think, by Dr. Weir. They continued to be pure fibroids while the patient was under my care. The last, although much larger than the first and having a more vascular covering, contained nothing but dense, interlacing fibrous tissue. I requested a specimen of the growths removed at the last operation so that I might ascertain whether they had undergone any structural changes during these many years. It is still a question among pathologists whether tumors recurring in this way can change, essentially, their nature. This case, having been watched for so long a time, is of especial interest."

One of these tumors was examined exhaustively by Dr. Edward Preble of Portland, Maine, and the following is his report with comments:

The tumor was somewhat kidney-shaped. It measured 3.5 cm. in length, 2 cm. in breadth and a trifle less in thickness. The middle third of the concave border, with a small, continuous portion of one surface, was occupied by a depression for the reception of the pedicle. Otherwise the entire surface was smooth and convex. The tumor was of a light gray color, and was firm to the touch. The pedicle was 2.5 cm. in length, was strongly curved, and had been attached to the auricle throughout its entire convex surface. (Fig. 1.) The whole mass weighed ten grammes.

A longitudinal, vertical section showed that the tumor was not homogeneous in texture. An outer, cortical por-

tion, coarsely striated like a fibroma, constituted about a third of the sectional area. This cortex was, however, absent at the inferior, central portion of the section. (Fig. 2.) The remainder of the sectional area of the tumor, which may be termed the medullary portion, had its centre made up largely of adipose tissue. This adipose area was bounded at one side by a bit of cartilage, which measured 1 cm. in height by 2 mm. in width. Sections made at different intervals through the pedicle, likewise showing the presence of cartilaginous and adipose tissue, seemed to demonstrate that the medullary portion of the tumor was simply the expanded pedicle.

The entire mass, save a bit of the cortex, was cut into sections. These sections almost invariably broke off at the inner confines of the cortical portion.

All the available sections were studied with an eye to topography, and, aided by the naked eye appearances, we have sought to restore a median, longitudinal section of tumor, amplified some 3 diameters. (Fig. 2.)

In attempting a general description of the tumor, it will be well to state, first, that the said tumor contained germinal matter in abundance, with the following tissues, viz.:—Myxomatous and adenoid tissues, giant-cells, fibro-plastic tissue, loose areolar tissue with infiltrated fat, innumerable elastic fibres, fine and coarse fibrous tissue, hyaline, reticular and fibro-cartilage, smooth muscle, fragments of large blood vessels and well-developed skin, —with corium, papillæ, rete muscosum, epidermis, hair-follicles, hair and sebaceous glands—together with certain unclassifiable structures.

Sweat-glands, nail, teeth, striped muscles and nerves were probably absent.

The dermal or tegumentary structures separated the cortex from the medullary portion. In fact, the latter was circumscribed by a layer of well-developed skin. The

outer cortex, while it consisted of nearly pure fibrous tissue, contained also traces of numerous other tissues in various stages of development.

By far the greater portion of the germinal matter and the various tissues developing therefrom was situated at the centre of the tumor, circumscribed by the dermal structures and the large plate of cartilage already mentioned, and associated with a large quantity of adipose tissue. To explain the presence of the latter we may compare it, because of its relationship to the new-formed skin, with the normal subcutaneous areolar adipose tissue.

A minute description of this tumor would transcend the limits usually accorded to reports of this kind. The cortical portion was made up chiefly of two types of fibrous tissue. In one, the small bundles of fibres were closely approximated side by side so as to form large planes, which ran in different directions — the tissue of fibroma pure and simple. In the other, the smaller bundles were united to form very large ones. These large bundles were loosely approximated, and the resulting areolæ were variously occupied. Some of them contained a formless myxomatous basis-substance. Others contained germinal matter, or partly organized tissues, — such as smooth muscle. A single epithelial tubular formation is deserving of especial mention. (Fig. 3.) It occurred in the extreme external portion of the cortex, and was instrumental in first calling our attention to the peculiar nature of the tumor.

The medullary portion of the tumor consisted of adipose tissue, fibrous tissue resembling the coarser sort which occurred in the cortex, and germinal matter, with various tissues undergoing development. The stroma of the adipose tissue was rich in elastic fibres. The fibrous tissue contained within its meshes a good deal of smooth muscle.

The germinal matter was made up of numerous closely aggregated spheroidal elements. From this brood-tissue

were seen arising adenoid tissue, multinuclear bodies, fibro-plastic spindles, smooth-muscle elements, little islets of cartilage and fragments of large blood-vessels. (Fig. 4.)

Turning now to the large plate of cartilage lying on one side of the germinal area, it seems very evident that it arose as hyaline cartilage from the said area and attained a sort of maturity. It consisted of pure reticular cartilage, and appears green under the microscope. One side ends abruptly, the other shades off into a kind of fibro-cartilage which stained readily with the carmine, and this in turn becomes merged into simple fibrous tissue.

We reach now by far the most unique portion of the tumor, namely the tegumentary structures. These did not form a complete septum between the cortex and medullary portions, for an occasional hiatus occurred where the fibrous tissue of the one was continuous with that of the other. In such situations the corium was folded inwards, i. e., was doubled upon itself, this reflected portion quickly becoming lost. (During the process of cutting the sections, the latter almost invariably broke off at the margin of the new-formed integument, showing that the terms cortex and medulla are not artificial.)

The corium was of moderate thickness, was rich in elastic and muscular fibres, and contained much germinal matter. It was prolonged beneath into either areolar adipose tissue or the coarsely fibrous sort. Some portions exhibited a papillary layer, the papillæ being low and disposed at regular intervals, the mucous layer being deep and containing in its lower layers much germinal matter. In this type of skin, hair-follicles were but scantily present. Other portions were devoid of a papillary layer, and were studded with closely aggregated hair-follicles opening at the surface. Such skin had a very shallow mucous layer, uniform in thickness with the outer root-sheath of the follicles with which it was continuous. In moderately thick

sections this entire layer appeared almost black. The horny layer, which was constantly present, differed in the two varieties of skin. In the first-mentioned, it was not at all flattened, but consisted of large lozenge-shaped epithelia. (Fig. 5.) In the other variety it was thin and flattened. (Fig. 6.)

The hair-follicles were as a rule imperfectly developed, and were seen in every stage of formation. They were generally provided each with a single sebaceous gland. The hairs were rudimentary, resembling linen-fibres in size and appearance. In addition to these superficial and normally situated follicles, others, perfectly closed, containing hairs and with sebaceous glands lay deep in the subcutaneous tissues. (Fig. 7.)

REMARKS.

Tumors which contain a heterogeneous mixture of all the tissues are called by Virchow *teratoid* (derived, I suppose, from τέρας, a wonder or monstrosity). It is true that a few of the most highly organized tissues are not represented in this specimen, but they might well have appeared in time had the tumor been left to grow further. As it is, the absence of striped muscle, teeth and the like does not invalidate its right to be classed in the teratoid group. The chief of the latter is the *dermoid-cyst*. A growth like that just described might become cystic, in which case it would contain such structures as were proof against liquefaction, as hair. Old authors allude to pilocysts about the face. But dermoid-cysts occur most often in or near the ovary, and may at times be the remains of abnormal gestation, which of course could not take place elsewhere in the body. Hence, though anatomically alike, a dermoid cyst of the ovary might have an entirely different etiology from a growth like our present subject.

For this and other reasons the word teratoid may be looked upon as a stop-gap and it is therefore pertinent to regard our tumor from a different standpoint. Wagner speaks of "mixed tumors" where a variety of tissues occur heterologously in certain organs, and says that such tumors are, as a rule, examples either of sarcoma or carcinoma. He does not imply by the term mixed, the teratoid class of Virchow, but rather neoplasms like chondro-sarcoma of the testicle. He probably does not include here mixed tumors which were at first benign.

From the amount and activity of the germinal matter in our tumor, coupled with its marked tendency towards local recurrence, I do not know why we have not to do with a mixed sarcoma. It has been said that some of the earlier recurrences were pure fibroma. I do not know whether or not the examinations were of an exhaustive character, but it certainly has never been a simple fibroid from a clinical standpoint.

Let us compare the growth with sarcoma in general, and in the first place with pure sarcoma. These are composed almost entirely of embryonal tissue, which should be organizable and contain perhaps the "promise and potency" of many different kinds of tissue. But for some reason it does not seem disposed towards organization. We see, however, feeble attempts in this direction in some instances. Sometimes an adenoid reticulum is reached (lympho-sarcoma); again spindle-elements are developed (spindle-cell sarcoma); lastly giant-cells appear in particular situations. In these alleged attempts towards organizing, the tissue of sarcoma resembles somewhat the small-cell infiltrations (tuberculosis, lupus, syphilis, &c., &c.). The failure in the latter cases to organize is said to be due to either a *constitutional* or a *local* debility or insufficience. For instance there is not enough vitality to form bloodvessels (some regard giant-cells as aborted bloodvessels). Sarcoma is,

however, capable of forming bloodvessels in abundance, yet these vessels are abnormally fragile and perishable.

Round-cell sarcoma and the slightly differentiated varieties recently mentioned are very often associated together in the same tumor. Notwithstanding their rapid growth and the abundance of living matter which they possess, there is much about them to suggest the absence of a certain vitality, this "absence" being either a constitutional defect or inherited from the tissue elements which had begotten the tumor.

But it is possible, in particular individuals and particular organs, that sarcoma may be capable of undergoing many degrees of organization; and it is very natural that examples of different degrees occur in the same growth, forming thereby the mixed tumors, while in exceptional cases a climax like the tumor under consideration is effected.

By far the most interesting thing about this view is the possibility that this act of organization is protective and conservative, the malignancy of the tumor being held in check for a while by this means. If good blood vessels can be formed, secondary infection can be prevented. But it may be said that such a protest of nature is at best a feeble one. I answer that perhaps our generalization does not end here, for it is possible that all benign tumors are successful results of nature's attempts to dispose of malignant growths. This is of course saying that all tumors are malignant in tendency. It has always been a particularly vexed question, that of the origin of benign tumors.

But let us suppose that some tumors are essentially benign, and that such tumors become malignant only through accident. It has been affirmed that the earlier recurrences of our tumor were examples of pure fibroma. Generally speaking, the microscopical diagnosis of tumors is often questionable. Many observers, either wishing to preserve their specimens as nearly intact as possible, or

being pressed for time, content themselves with preparing sections from isolated portions of the tumor. The resulting diagnosis holds good for these sections alone. But granting that the examinations are exhaustive, anatomy is not everything, for some attention must be paid to the clinical aspect.

To illustrate this view it is only necessary to allude to those apparently simple benign tumors—such as myxoma, fibroma, chondroma, &c.,—which are, on rare occasions followed by secondary foci in the lungs and other viscera, these secondary tumors being homologous with the primary ones. This phenomenon of infection of the viscera through the blood channels is so characteristic of the sarcomata—and for obvious reasons—that we are justified in assuming that these "benign" infective growths, masked though they may be by organization, are essentially sarcomatous. Hence, *essential* sarcoma may exist, not only as a mixed tumor (consisting of normal tissues plus a good deal of germinal matter) but as an apparently benign tumor (with only a modicum of germinal matter.)

Clinically, and to some extent, anatomically, this growth resembles a fibrosarcoma. The distinction lies in the fact that a higher organizing capacity than would produce a mere fibrous stroma is present here.

The majority of pathologists would doubtless deny that *every* casual production of germinal matter could through any possibility form epithelial tissue. We can only say that this is a matter of opinion.

This leads us to call attention to the fact that the skin occurring in this tumor is not to be looked upon as an organ, for both sweat-glands and tactile papillæ are wanting. It is rather a mere tissue. As for hairs, they are to be regarded simply as modified or differentiated cuticle, and in this particular growth they may be looked upon either as an integral portion of new-formed tegumentary structures,

or as having developed in virtue of a specially present organizing capacity.

The fact that newly-formed epithelia are present in this tumor naturally suggests a comparison with epithelial neoplasms in general, particularly as scant mention of the latter has been made in our general remarks on tumors. We limit ourselves for want of space to the discussion of carcinoma. All actively growing cancers contain such a great quantity of germinal matter that they may be regarded, at least anatomically, as examples of mixed sarcoma. In the hard cancers a good part of this organizes into fibrous tissue. Large areas of the average scirrhus are hardly distinguishable from fibro-sarcoma save perhaps with regard to the tendency towards fatty degeneration; and Orth assures us that in certain cases of scirrhus of the stomach we may seek in vain for any appearance of epithelia, the walls of the stomach having become altered to a board-like mass consisting of dense fibrous tissue (cancerous induration of the stomach.) This is another instance of the fallibility of a purely anatomical diagnosis, for, according to Orth, the cancerous factor in induration of the stomach was long undetected. This extensive formation of fibrous tissue which takes place in atrophic cancers is often protective and conservative in its effects. With regard to the soft cancers they too often contain so much embryonal tissue that it is no easy matter to distinguish the epithelial element, and probably for this reason, encephaloid and round-cell sarcoma are often mutually confounded, just as they used to be before the era of the modern classification of tumors, while some pathologists use the term "sarcoma carcinomatosum" to designate certain cases of medullary cancer. The relationship between new formed epidermis which has developed heterologously and the epithelioid tissue of carcinoma is obscure, for it would be hard to state whether the latter is

an attempt at protective organization, or an indication of special malignancy. This obscurity springs from the fact that the epithelioid tissue differs from all others in being heteroplastic. The peculiar duct-like formation which has been mentioned as having occurred in the tumor probably had no relationship with the new-formed epidermis.

Before dismissing the subject of the possible capacity of the essential sarcoma for organization, it may be well to remind the reader that Billroth regards the spindles in spindle-cell sarcoma as being homologous *not* with aborted fibro-plasts, but rather with smooth-muscle elements.

Those who have explained the presence of hairs in new-formations by saying that the lining of the cyst-walls becomes metamorphosed into skin and its appendages, must now admit the existence of a second origin for this phenomenon.

A CASE OF VERY OBSTINATE DESQUAMATIVE OTITIS MEDIA FINALLY CURED. REMARKS.

By Dr. H. Knapp.

I select a case as a basis for some remarks on the management of obstinate forms of chronic suppurative inflammation of the middle ear. It was as follows:

H. D.'s daughter had scarlet fever in her third year and otorrhœa, with more or less impairment of hearing, ever since. She consulted me in November, 1876, when she was 13 years old, having large perforations in both drumheads, moderate discharge, *h* R $\frac{2}{24}$, L $\frac{1}{\infty}$; *v* R $\frac{20}{60}$, L $\frac{3}{60}$. The posterior walls of both middle ears were swollen and covered with white scaly masses, which could only insufficiently be removed by syringing. I had lukewarm water dropped in the ears three times daily and after syringing and wiping them out, a solution of sulpho-carbolate of zinc 1 per cent. in alcohol 20 per cent., and water 80 per cent., was instilled. The discharge soon stopped, the swelling of the mucous membrane and the scales diminished, the hearing in the right ear became normal, in the left $\frac{15}{20}$. This rapid and great improvement lasted only a few days, then a great deal of offensive discharge appeared and the hearing was impaired again.

I gave her a tonic (powder of reduced iron and rhubarb;) washed the ear out with a solution of carbonate of soda, and instilled tannin disolved in alcohol and water. She soon improved again.

This condition of alternating ameliorations and ag-

gravations lasted several years. Her naso-pharynx was fairly normal. The relapses seemed to have their cause within the tympanic cavity. The perforation in the drum-head varied in size, at times nothing of the *Mt* could be detected. The swollen mucous membrane and the depositions of scales tenaciously adhering to the projecting walls, especially the postero-superior, with more or less purulent and offensive discharge, formed the usual status of the ear. At other times all those symptoms improved, the *Mt* reappeared at the periphery, formed a thick ring with a sharply defined, round or oval perforation which at rare and short intervals was even closed altogether. Her hearing was subjected to the greatest variations, sometimes being almost normal, at others so bad that she could understand words only when directly spoken in her ear. Among other remedies, solutions of nitrate of silver from 1 per cent. to 12 per cent. were used, but nothing produced a permanent improvement. Polypoid growths could never be recognized, the mucous membrane presented a uniform, more or less dense tissue, most of the time coated with tenacious accumulations of white scales. There never were any mastoid or cerebral complications, nor could, on probing, carious or necrosed bone be detected. It was on the whole, an uncomplicated, but very obstinate case of purulent desquamative otitis media.

In the winter of 1880 to '81, her hearing was so bad and the condition of the middle ear so little influenced by treatment, that I advised her to let Dr. C. Hackley take charge of her case, with the particular object to try whether the insertion of an artificial drum membrane by his hands would not benefit her more than by mine. I had the pleasure to learn that she really derived considerable benefit from his treatment, but after six months Toynbee's drum membrane which Dr. Hackley had used, ceased to be of use. She left it off and did nothing for a year than cleansing the ear once or several times a day.

In the Autumn of 1882, she returned to me in a condition as bad as ever. On the left side she heard only loud voice directly spoken into the ear; on the right, she understood speech at a distance of from one to two feet. She had also pain in the right ear and mastoid, and in the right half of the head. The bone conduction was good. The tympanic cavity contained offensive pus, accumulations of scales and its mucous membrane projected considerably at different places, especially at the posterior and anterior sides.

As probing revealed no necrosis, and I was loth to scrape the torpid proliferating mucous membrane out, I stimulated it by letting the patient wear cotton pellets steeped in a solution of glycerine and nitrate of silver. In the course of a few weeks the scales detached themselves, the secretion became profuse and purulent, and the luxuriant mucous membrane projected in form of polypi which could be moved with a probe. In two sittings I removed larger polypi with the forceps, and had a solution of impalpable boracic acid powder in absolute alcohol instilled three times daily. The tympanic cavity could now be thoroughly cleansed by syringing. Two weeks later, a small polypus from the lower wall was snared off, the alcohol-boracic acid instillations were continued until the secretions had become scant and the swollen mucous membrane was reduced to almost its normal thickness. When roots of polypi and ulcers of the mucous membrane could no longer be detected, I let the patient wear a cotton pellet, steeped in glycerine lotion, as an artificial drumhead. The secretion had now become muco-purulent, was very scant and the hearing $\frac{20}{60}$ for the voice. As soon as she heard equally well without the pellet, I let her wear this only at times and instil a weaker solution of alcohol and boracic acid.

The drum head made its appearance again, this time not as a thickened reddish ring bulging at different places as it

did before, but as a delicate pale-grayish membrane. I now advised her to cleanse the ear with a plug of absorbent cotton on a probe and fill it with boracic acid powder. The powder soon remained dry, was syringed out only once or twice a week, and finally left off altogether. The ear was cleansed with cotton every four or five days, and protected with a very thin plug of cotton. In February the discharge had completely stopped, and through a small perforation the mucous membrane of the promontory was recognized as being thin and pale. In Spring the perforation was closed and the hearing good. A few days ago, at the beginning of July, 1883, I found the mucous membrane entirely restored, pearly gray, somewhat irregular, but its chief details, short process, handle, and cone of light, distinctly recognizable. She had not suffered from this ear for the last three months and her hearing had been invariably good, namely, $v\ \frac{20}{20}$.

All this refers only to the right ear. The left, which always had been very poor, still presented a somewhat swollen, torpid mucous membrane, with scant muco-purulent discharge. Nothing had been done for it than cleansing and putting in dry boracic acid powder.

REMARKS.

I have taken the liberty of presenting the history of this case as a new confirmation of views which I expressed before this Society at its meeting of last year, concerning the treatment of granulations and polypi. I stated that in cases of diffuse granulations and broad sessile polypoid excrescences I abstained from destroying them by caustics or sharp instruments, because these procedures are liable to destroy essential parts of the drum-cavity, and replacing the mucous membrane by cicatrical tissue, bringing about the unpleasant condition known as sclerosis. Among the

different forms of chronic suppuration of the middle ear, the desquamative form is one of the most obstinate. Pathological anatomy has shown that granulation tissue and polypi are always connected with it, and I think we may assume that a torpid condition of the proliferating mucous membrane is the cause of the formation of the scales which dry up, and not being swept away by a sufficient flow of moist secretion, accumulate and adhere to the tissue as white coats, nodules, and even larger tumors, cholesteatomata. As scraping them off will not prevent the formation of new masses, as astringents and also boracic acid and alcohol prove insufficient, and as destruction of the mucous membrane is injurious to the integrity, or the restoration of the normal parts of the middle ear, the only reasonable plan seems to be to alter the condition of the torpid mucous membrane by converting the chronic inflammation into an acute one, soaking the hardened hypertrophied mucous membrane by instillations of warm water, keeping it moist by cotton steeped in glycerine, and promote its activity by mild caustics. If in this way the copious exudation of lymphoid elements and blood plasma loosens and sweeps away the scales and incites the torpid mucous membrane to luxurious proliferation, we have brought about a much more tractable condition, an active suppurative otitis media with larger polypoid excrescences. These can be removed in well-known manner, and the mucous membrane reduced to its normal state. If, then, our endeavors are crowned by the restoration of the drum-membrane and the permanent reestablishment of good hearing, as in the case just related, we may not without a good deal of satisfaction, believe that we have rendered our patients an essential service.

DISCUSSION.

Dr. Theobald of Baltimore, said that Dr. Knapp in the case under observation spoke of the drum-membrane as having been entirely destroyed, and then after a short time being reproduced completely. He had not supposed that reproduction of the drum-membrane ever took place when it had been completely destroyed.

Dr. Knapp said that at one time there was nothing seen of the drumhead, but that afterwards a drumhead had formed.

Dr. Theobald said the reason why he asked the question was because it was such an unusual occurrence, and he would ask further whether it was the restoration of the drum membrane proper, or whether it was merely cicatricial tissue, that is often found forming over the fundus of the ear, often having the malleus incorporated with it, usually, however, more less depressed. He was not aware that restoration of the drumhead proper had ever occurred.

Dr. Knapp thought that the restoration is usually more or less composed of cicatricial tissue. There are cases, however, in which we see nothing of the drumhead, and afterwards it comes out in its details, and so it was finally in this case. The defect may have been filled up with cicatricial tissue, but here it does service.

Dr. Theobald said he simply wished to know whether the membrana tympani was restored as a true membrane or not, or whether such an occurrence ever takes place.

Dr. Noyes, of New York, said that he had seen the reproduction of the drum head in one instance.

Dr. Sexton, of New York, had seen a number of cases (alluding only to the existence of granulation tissue in the middle ear,) where the granulation tissue has come through one, two or three perforations, and where from the congestion of the parts and thickening of the membrane, it

has been impossible to differentiate between the granulation tissue and the membrane proper, but when these polypoid masses have been removed, and other conditions treated, he had seen such membranes clear up, and under some circumstances he had seen the opening closed by a new growth of the cutaneous layer, but not by the membrana propria. These cases are generally those which have lasted for a good many years.

Dr. Jones, of Chicago, asked Dr. Theobald if he understood him to say that he was not aware that the membrana tympani had ever been reproduced.

Dr. Theobald said that he was not aware that the typical membrane, having been destroyed, had afterwards been restored. He was aware that a tissue forms over the entire fundus of the ear, which he sometimes had seen, but by restoration he meant beginning as a membrane in its normal plane, and extending until the opening was completely closed.

Dr. Jones said that the literature of otology gives a number of such cases, and he had had in his experience, three. In one case there was restoration of the drum membrane which was thin, pearly, lustrous, which stretched completely across, changing by inflation, and this restoration took place in a case in which suppurative process had existed thirty years. In another case the suppurative process had continued twenty years. Probably there were not the three layers normally found in the membrane, but it was sufficiently lustrous to reflect the light and changed evidently on inflation. The malleus was not to be seen because the ossicles had been destroyed. He thought Dr. Spencer, of St. Louis, had reported one or two similar cases.

Dr. Sexton thought that Dr. Theobald did not give sufficient credit to cases which had been reported; he had seen a number where a membrane had closed the external

auditory canal after long continued inflammation of the middle ear. But this is not in any sense the membrana tympani. He had watched in many instances, cases of inflammation of the middle ear, including the inner end of the canal where the cutaneous membrane has become reproduced, as it were, from a nearly destroyed membrane until it has met and formed quite a distinct membrane, sufficient to entirely close the canal.

Dr. Little of Philadelphia, thought that Dr. Buck had reported cases of restoration of the drum membrane in 1875. Since that he had endeavored in several instances to stimulate the structure to reproduction, but the success was not at all marked.

Dr. Theobald thought that the published cases would have to be carefully examined before being accepted as those of restoration of the membrana tympani in the sense to which he alluded. A portion of the membrane might be formed about the malleus, and then cicatricial tissue formed, and the two together might form a membrane described as reproduction of the membrana tympani.

Dr. McKay said that his observations coincided with those expressed by Dr. Theobald, and were based on a study of cases of purulent otitis media with perforation of the drum membrane. He had observed 230 cases with complete histories. In 25 there was perforation of the drum-membrane and in all but four had healing taken place, but in no instance had the drumhead been reproduced in the sense of a regular Mt. in cases in which it had nearly all disappeared. He had always been able to find a slight remnant of membrana tympani like a ring about the bony margin.

Dr. Merrill referred to a case in which the membrane was entirely gone, not the least trace of it could be seen along the bony wall, but in just five weeks afterwards there was a perfectly formed membrane, and he supposed that it was restoration of the drum head.

Dr. Knapp said that the discussion on his paper had turned somewhat out of the channel which he had expected, and had been devoted to the question as to whether the drum-membrane can be reproduced or not. The stress which he laid in his paper was upon the fact that when there is desquamative otitis media there may be palliative treatment, but that the torpid membrane will secrete these scales again, the drum head will again rupture, and this process of secretion will last until there is a radical destruction of this tissue, and all of these exuberant masses are wiped away. The condition is somewhat similar to that which exists in a torpid fistulous passage, and only when the lining of such a fistula is entirely destroyed, is permanent healing obtained. In these cases also palliative treatment will effect only a temporary cure, and this was repeated in the case which he had reported until afterwards the condition was converted into an acute one; and was so changed that polypi and granulations were produced which could be treated and cured. The idea is, that a chronic, intractable condition should be changed into an acute one which is seizable.

ANOMALOUS SEBACEOUS GLAND IN IMMEDIATE PROXIMITY TO THE AURICLE.

By Charles A. Todd, M. D. *St. Louis, Mo.*

Last year a patient came into my hands suffering from follicular abscesses in both auditory canals. He was a large well-formed man and employed in the St. Louis police force, holding a responsible position. After several visits he called my attention to a peculiarity which is the subject of this paper: Immediately in front of each auricle and on a level with the beginning of the helix, was a small oval depression in the skin not noticeable except on special examination. This was the mouth of a subcutaneous canal, measuring in length on the right side, 9 millimeters; on the left, 12 millimeters; the opening itself just admitting the point of the common silver probe. The direction of the canals was downwards in a straight course, the probe could be easily felt at all points.

The patient fancied that these canals had something to do with the abscesses that were giving him so much trouble, since they secreted a yellowish matter that at times required to be expressed to obviate discomfort. During his youth this secretion was abundant, requiring daily expression, else the canals would become distended and painful. He had two brothers and three sisters. The former and one of the latter had the same peculiarity, but he only, suffered inconvenience; of his parents and grandparents and other relatives he could give no history.

Of his eight children, a girl aged 11 years has a follicle

on the right side, it is 3 millimeters in length; another girl of 7 years presents it on both sides, length, 6 millimeters; a boy 8 years old, both sides and 6 millimeters in length.

Canals about the ears are found that are considered to be relics of embryonic conditions, but these, according to description, are very different from the ones in question, which unmistakably are simple sebaceous follicles. The secretion under the microscope exhibits fat granules, free or still intra-cellular mingled with epidermis scales.

In the elephant similar crypts are found, though not opening so near the auricle, otherwise occupying a corresponding region. In two African elephants that I have dissected, the crypts were subcutaneous and appeared to be of the nature of sebaceous follicles. Among keepers of these animals it is fancied that these crypts are connected directly with the eyes, and some are careful to keep them free from collections of secretion by squeezing out their contents, as there seems to be an accumulation. This notion, of course, is baseless, as there is no such connection, the canals being distant from the eyes and quite short.

ON THE ASSOCIATION OF AURAL DISEASE WITH SIMPLE SPARKLING SYNCHISIS OF THE VITREOUS HUMOUR.

By Charles J. Kipp, M. D., *Newark, N. J.*

At our last meeting I stated that I had seen a number of cases of sparkling synchisis in which deafness or impairment of hearing of one or both ears was present at the same time. Since then no new cases of simple synchisis scintillans have come under my observation, but I have searched my records for cases of this disease and have as far as possible re-examined the patients of whom I have notes. I find that I have more or less complete notes of seven cases of sparkling synchisis, and in all but one of these ear disease was present. In the seventh case, which was seen several years ago, the patient consulted me with regard to a burn of the eyelids and the sparkling synchisis was discovered by mere accident. Although my notes make no mention of impairment of hearing in this case, I am by no means sure that such did not exist. The patient was at the time I saw him suffering greatly from the burn, and it is not probable that under the circumstances he would have called my attention to a painless ear trouble, even if such had existed. I have recently made every effort to ascertain the whereabouts of this man for the purpose of examining his ears, but have thus far failed to find him.

For the benefit of those of my hearers who have not made a special study of the diseases of the eye, I may be

permitted to state that simple sparkling synchisis is a disease of comparatively rare occurrence and that it is but seldom seen in persons under fifty years of age. In all the cases here reported, the anterior part of the eye was apparently normal. The crystalline lens was in its proper place and intact. The vitreous body contained numerous small sparkling particles which danced about on every movement of the eye and sank out of sight when the eye was at rest. The vitreous humor contained no other opacities, and the optic disk, the retina and the choroid were apparently healthy. In some of the cases, the disease was confined to but one of the eyes.

The glistening particles here spoken of have been generally regarded as crystals of cholesterine, but PONCET, who has recently had the opportunity of making a microscopic examination of two eyes in which the sparkling synchisis was observed during life, found that crystals of cholesterine were present only in relatively small quantities. In addition to the cholesterine he found masses of phosphatic salts and crystals of tyrosine. The phosphatic masses were very numerous and formed globes which were covered with innumerable sharp points and reflected much light when brightly illuminated. The phosphatic crystals were in part precipitated upon cells of the vitreous which were in a state of proliferation and corresponded to the cells which are found in the vitreous in certain forms of choroiditis. PONCET is of the opinion that the synchisis scintillans is the result of fatty degeneration of the vitreous, a condition analogous to atheromatous degeneration of the arteries in which similar chemical products are found. WECKER thinks that this disease is dependent in old people on hypertrophy of the vitreous membrane, diminished exosmosis, and fatty degeneration of the vitreous body, while other authors believe it to be the result of hemorrhage in the vitreous. Judging however, from my own experience,

the development of this disease after hemorrhage in the vitreous, must be an extremely rare occurrence, since in none of the many cases of hemorrhage in the vitreous which have come under my observation, has this accident been followed by anything resembling the affection under consideration. Whether disease of the liver, gallstones, &c., stand in a causative relation to sparkling synchisis, as is supposed by some physicians, is extremely doubtful. There is at least, no evidence that such is the case.

The cases observed were as follows:

I. Male, fifty-one years of age. In good health. Synchisis scintillans of *left* eye only. Vision normal. Has been deaf in *left* ear for many years. Cause unknown. Since two years otorrhœa from this ear. Neither voice, watch nor tuning-fork is heard in this ear. Tuning-forks placed on vertex or on left mastoid are heard only on right side. Large perforation. Handle of malleus absent. Cavum tympani full of granulations. Eustachian tube permeable. *The other ear is normal.* Patient was seen but once. Further history unknown.

II. Mary B., thirty-six years of age; married; in good health. Synchisis scintillans of *right eye only*. Disease of *both* ears. Deafness has developed gradually for several years. Troublesome tinnitus. With both ears hears tick of watch (normal distance 60 inches) at 2 inches. Hears both high and low tuning-forks when placed on vertex and on mastoid process, also when held in air about an inch in front of meatus. Hears tuning-fork held before meatus after she has ceased hearing it on mastoid. Voice is badly heard in both ears. Drum membranes opaque and sunken. Mobility unimpaired. Light spot distorted. Tubes permeable. Sounds dry. Inflation of middle ear causes bulging of upper and posterior part of drum membrane. Has some naso-pharyngeal catarrh. Was under treatment for several weeks, and was considerably im-

proved in hearing. Three months later she returned, the deafness having again increased. Was treated again by inflation, and application to the naso-pharynx as before, but without improvement.

III. Rufus K., fifty-seven years of age. Is in excellent general health. Synchisis scintillans in *right* eye only. *Both* ears are affected. Deafness has been steadily increasing for a number of years. Much tinnitus. Hears voice very badly. Does not hear watch on contact in either ear. Hears tuning-fork placed on vertex plainly in both ears. Tuning-forks are heard longer when held in air in front of meatus than when placed on mastoid. The membranae tympani are dull, opaque and sunken. The light spot is small and distorted. The mobility of the drum heads is somewhat impaired. The Eustachian tubes are permeable. Sounds dry. Very little naso-pharyngeal catarrh. Was treated by inflation through catheter for several weeks, but without benefit. A year later this man was again seen and the impairment of hearing was found to be greater than before.

IV. George F., sixty-five years of age. In robust health. Synchisis scintillans in *left* eye only. Disease of *both* ears. Has been deaf for a number of years. Constant tinnitus. Hears voice very badly. Does not hear watch tick on pressure. Hears tuning-forks better when held in air in front of meatus auditorious than when placed on mastoid. The drum membranes are opaque and sunken. Light spot irregular. Mobility of drum membranes unimpaired. Eustachian tubes permeable. Sounds dry. Very slight naso-pharyngeal catarrh. Was treated by inflation through catheter for many weeks without the slightest benefit.

V. Hiram McC., seventy-six years old. Decrepit old man. Synchisis scintillans *both* eyes. Deafness *both* ears. States that at the battle of Petersburg, Va., in 1862, he was lying under a 36-pound gun while it was fired and

that since that time his hearing is much impaired. He is an applicant for pension. Hears voice badly. Watch tick in right not at all; in left, on pressure. Hears tuning-fork better through air than through bone. Drum membrane presented but slight changes in transparency and curvature. No cicatrix visible on either drum membrane. Tubes were permeable. Sounds dry. Was treated by inflation through catheter for a long time without improvement. This man being an applicant for pension probably exaggerated his impairment of hearing; frequent examinations under various circumstances have, however, convinced me that considerable impairment actually exists.

VI. Mrs. A. G. S., forty-one years of age; in very good health. Synchisis scintillans of *right* ear only. Deafness of *right* ear only. This ear is totally deaf and has been in this condition as long as the patient can remember. Neither voice, watch nor tuning-fork is heard in this ear. In appearance the drum membrane differs in no way from that of the other well ear. Eustachian tube is permeable. Sounds dry. As the condition was hopeless, no treatment was attempted.

From the above it will be seen that the sparkling synchisis was confined to one eye in five of the cases; in two of these the ear of the same side only was the seat of disease; in the remaining three cases both ears were affected. In one case both eyes and both ears were diseased.

In five of the cases the ear disease involved the middle ear, and in one case at least, if not in all, also the nervous apparatus. In only one case were signs of middle ear disease absent.

So far as I know, no similar observations are to be found in otological or ophthalmological literature, and it is therefore not improbable that the co-existence of the eye and ear diseases observed in the above cases may be purely

accidental. Cases of simple sparkling synchisis of the vitreous are, however, not sufficiently common to enable a single observer to draw conclusions of any value with regard to this point from his own limited experience, and my object in bringing these cases to your notice, was chiefly to induce others who may meet with cases of synchisis scintillans to examine these cases for aural diseases and thus settle this question.

DISCUSSION.

Dr. Little said that since Dr. Kipp, at the meeting at Lake George, had made a verbal communication on this same subject, he had seen three cases in which he had tried to corroborate Dr. Kipp's observations, but in these there was no involvement of the ear at all.

Dr. Webster said he had recently looked up all the cases which he could find in private practice, and he did not remember that there was any impairment in hearing in any of the patients. He thought it would have been noted had there been any trouble in this direction.

Dr. Knapp had seen three cases, and examination of the ear in each was negative.

A CASE OF PRIMARY EPITHELIOMA OF THE AURICLE.

By W. W. Seely, M. A., M. D., *Cincinnati, O.*

The history of the following case of epithelioma, occuring primarily in the auricle, is accompanied by the auricle itself, with wood cuts showing the same entire and in section, and also a microscopic slide.

H. C., æt. 60, inmate of the Soldiers' Home, Dayton, O., came to my clinic, at the Medical College of Ohio, Feb. 6, 1883, for relief from a large, sensitive, readily bleeding sore on the right auricle.

He stated that six years ago, while asleep, he was bitten on the ear by a rat. This wound, though treated in various ways, never healed, and there was finally developed the growth now presented. Till within the last year the patient had not been specially incommoded. During the last year the growth had increased rapidly, and bled very freely when irritated, so the man had an exhausted and anxious appearance.

The point of the original wound was near the summit of the helix.

At the time of the patient's visit, the growth, as will be seen by the cuts, involved a large portion of the auricle. The entire auricle, except its lobule, was swollen and reddened, and the skin behind the ear was, for some distance, reddened, but not infiltrated. The glands were not enlarged.

On Feb. 10th, 1883, I removed the entire auricle with

the thermo-cautery (Paquelin's,) the hemorrhage being but slight, three or four small arteries spirting a little till touched.

The entire surface was covered with a thick layer of boracic acid powder, and kept so from first to last, so the suppuration was but slight, and the patient sent home in less than five weeks with a perfectly smooth scar. The orifice of the meatus, not having been touched, retained its normal caliber.

REMARKS.

I do not know that epithelioma of the pinna needs any special consideration on account of its position. Its course in this location, so far as I am aware, differs in no essential particulars from that in other localities.

The literature on the subject is meagre, consisting of the reports of a few authenticated cases, alluded to and reported in some of the text-books, and in a report by our President, Dr. J. Orne Green, published in the Society's transactions of 1870.

The English translation of Politzer would rather lead the reader to infer that primary epithelioma of the auricle was by no means rare, which does not correspond with the above statement, an inference drawn by my, it is true, not exhaustive research.

Probably such a specimen as the one presented will be a curiosity to many, as it certainly was to me, being the first that has come under my observation. The case certainly demanded, without question, the most radical treatment.

The thermo-cautery, it seemed to me, would be well adapted for the removal of the auricle, and certainly did the work well. Still I believe with the knife and twisting or ligating the small arterial branches, a practically non-suppurating surface would be had under the boracic acid treatment, and the healing period reduced at least one-half.

Anterior view, normal size.

Posterior view.

Section showing strip of Aural Cartilage.

DISCUSSION.

Dr. H. Knapp of New York, asked the age of the patient, and further stated that it was rare to see epithelioma, arising from trauma.

Dr. Seely replied his age was 60. He thought it generally accepted that epithelioma is due to trauma, and asked Dr. Knapp what he would regard as the cause in epithelioma of the lip, for example.

Dr. Knapp said that the disease in that case might be due to constant irritation of the lip, but that is not exactly traumatism as the term is generally understood.

Dr. Seely regarded it as the perfection of trauma. He thought the interest in this specimen consisted in the disease appearing where epithelioma is not likely to develop and where trauma is not likely to occur. If the growth had appeared in the meatus auditorius the fact would not have been so peculiar, or if it had developed upon the lip or eyelid, as upon the summit of the helix.

OBSERVATIONS ON THE HEARING POWER IN DIFFERENT CONDITIONS.

By E. Eugene Holt, M. D., *Portland, Maine.*

In presenting further observations upon the conducting and perceptive apparatus of the ear, the following series of cases have been carefully examined, tabulated and compared:—twenty-four cases of chronic non-suppurative otitis media from my private practice; twenty-four machinists; twenty-four boiler makers; and twenty-four normal ears.

The first series of twenty-four were persons of various occupations, taken from 389 cases of diseases of the ear recorded by me during the past year.

The diagnosis was chronic non-suppurative otitis media. They were selected without discrimination, except to take those who had been seen by other good observers who had made this diagnosis. Fourteen were males and ten females, with an average age of 36.6 years.

As a class they did not hear the tick of the stop watch or the voice very well, and conversation was carried on with more or less difficulty, close at hand, with a majority of them.

The average duration of the disease as given by themselves was about 13 years. In the right ear, 15 heard the tuning-fork longer by aerial than by bone conduction; 7, longer by bone than by aerial conduction; while in two instances it was heard an equal length of time each way.

In the left ear, 12 heard it longer by aerial than by bone conduction; 9, longer by bone than by aerial conduction,

while in three instances it was heard an equal length of time each way.

On an average, the tuning-fork was heard 1.2 times longer by aerial than by bone conduction.

Nineteen were tested by Koenig's rods, without any discrimination whatever, and the average audibility for the upper limit was, for the right ear, 35,000 V. S.; left ear, 34,200 V. S.

The machinists examined work in apartments close to those of the boiler-makers, and are necessarily subjected to a considerable noise.

They were a superior class of intelligent mechanics, men who would have done good work in any profession.

The average age was 35.4 years, the youngest being 20 and the oldest 54 years of age.

They were men of good physique and generally in good physical condition, with good habits, the details of which will be omitted.

Three of them complained of more or less difficulty in hearing conversation or public speaking well; one of these had worked at this business 38 years, and could not hear the tick of the stop watch from either ear, while the other two heard it as far or farther than many of those who replied affirmatively to the question as to whether they heard conversation well.

In four the hearing power was normal. Two of these had been in the employment two years, one ten years and one fourteen years.

When a difference in the hearing power of the two ears occured, the tuning-fork C, when placed vibrating in the centre of the teeth, was invariably heard better in the ear more defective for aerial sounds.

The sound of it was invariably increased by pressing on the tragus and closing the meatus—on an average it was heard 1.5 times longer by aerial than by bone conduction.

In the right ear, 22 heard the tuning-fork longer by aerial than by bone and two heard it longer by bone than by aerial conduction.

In the left ear, 22 heard it longer by aerial than by bone conduction, one heard it longer by bone than by aerial conduction, and one heard it an equal length of time each way.

Fifteen were tested by Koenig's rods, without any discrimination whatever, and the average audibility for the upper limit, for the right ear, was a tone of 40,000 V. S., that for the left ear a little more than this.

The meatus was found normal, with but little or no cerumen present.

In only one case was it found impacted. In the twenty who had defective hearing, examination showed a condition which does not differ materially from the condition of those who seek advice, and are recorded as having chronic catarrhal or non-suppurative otitis media.

The Eustachian tube was patent by self-inflation, as evidenced by the usual sensation, and objective movements of the membrana tympani.

The average length of time the men had worked at this employment was 12.6 years.

Six had worked between 2 and 10 years; 6 between 20 and 30 years; and 2, 38 years each.

The average age of the boiler-makers was 32.1 years, and the average length of time they had worked at this business was 14.1 years.

As a class they heard the tick of the stop watch and the voice, better than those of the first series from various occupations; and conversation could be carried on at 2 to 4 m. well or fairly well, with a majority of them. Blake's large tuning-fork was used in testing these cases.

With the clamps 38 mm. from the end of the tines, and the hammer raised 28 mm. and allowed to strike the tine

12 mm. from the end, it was heard, on an average, by bone conduction, in the right ear 26.7 seconds; in left ear 28.2 seconds; aerial conduction, right ear 65.9 seconds, left ear 68.7; thus giving an average of 2.4 times longer by aerial than by bone conduction.

Koenig's rods were used in every case, and the average audibility for the upper limit, for the right ear was 39,166 V. S. Left ear, 38,541 V. S.

The object of testing normal ears was for the purpose of ascertaining the length of time Blake's tuning-fork could be heard by bone and aerial conduction; and also, to compare the average upper limit of audibility of these ears for Koenig's rods with the preceding series of tests, and with the results obtained by Dr. Blake.(1)

It was with considerable difficulty that persons were found who answered to the standard taken as a normal one; and a large number were rejected who claimed that they never had any aural trouble, and that they heard perfectly.

It may be said that some of those included in this series, although responding to the tests taken as normal, could not be considered as such, since some of them responded to a much higher standard, while others, who did not, had present symptoms or a past history of affections of the middle ear.

Eighteen were males and six were females, with an average age of 18.7 years; the youngest being 7 years and the oldest 34 years.

As a result, it has been ascertained, that the vibrations of a tuning-fork, when produced in the manner indicated, are heard, on an average, by bone conduction 31 seconds; by aerial conduction 116 seconds, or 3.7 times longer by aerial than by bone conduction.

In reviewing these cases, we find that, as a class, those

(1) American Journal of Otology, Vol, 1, page 272.

taken from the various occupations did not hear the voice and tick of the stop watch as well as the boiler-makers; who, in turn, did not hear them as well as the machinists.

The tuning-fork employed in testing those from various occupations and also the machinists, was an ordinary C, 16 cm. long, the tines of which could be readily pressed together by sliding them between the thumb and forefinger, thus obtaining a definite and uniform vibration.

But, from continued use, it diminished in its vibrations, until after using it several times, subsequent to the completion of these two series of tests, it ceased to vibrate.

On testing the boiler-makers and those who had normal ears, with Blake's large tuning-fork, it was very evident that the ratio obtained between hearing *it* by bone and aerial conduction more nearly represented the actual facts than did the results obtained in the first two series of cases with the ordinary C fork.

Upon testing, as many as could be seen again, by Blake's tuning-fork, this was found to be the fact; so that the ratio between bone and aerial conduction for Blake's large tuning-fork, set in vibration in the manner indicated, would be increased in the first series of cases, to 1 to 2.2, and in the second series, the machinists, to 1 to 2.5.

It will be seen then, that in these three series of cases, the hearing power for the voice and the tick of the stop watch diminishes as the ratio between the bone and aerial conduction decreases.

Why, in disease of the middle ear, it should be claimed that the normal ratio between bone and aerial conduction for the tuning-fork (1 to 3.7 as shown by the fourth series of tests) should be necessarily reduced to one or less than one, has not been apparent to me, since cases have been so frequently met with in which this did not occur and we

have the highest authority ([1]) for asserting that this is by no means a constant occurrenee.

Why, in the same degree of deafness, in disease of the middle ear, the tuning fork should be heard better in one case by aerial and another by bone conduction; in other words, why Rinne's experiment should be positive in one case and negative in another is not always apparent.

Some of these cases certainly come under intermittent aerial and bone conduction, since, in several of the series taken from my case book, a marked change took place after treatment, which consisted principally in opening the Eustachian tube.

This change was always in favor of substituting a positive for a negative result of Rinne's experiment, and, although it improved the hearing power, can any one claim that it essentially changed the nature of the disease?

In the left ear of one of the series from my case book, there was undoubtedly, an affection of the labyrinth, since the perception of external sounds was very defective and the audibility for Koenig's rods was only 20,000 V. S.; still the tuning fork C, 16 cm. long, was heard 6 seconds by bone, and not at all by aerial conduction.

As has been said, several of these cases have been seen by other good observers whose diagnosis agreed with that recorded.

One of these in which the diagnosis of ch. non-sup. otitis media with labyrinth disturbance had been made was seen by Dr. Blake, who got the impression from my letter that I had made a diagnosis of disease of the labyrinth and wrote me as follows:—

"I am very glad to have seen Mr. F., and found his case a very good illustration of the way in which a comparatively innocent disease of the ear may play an important part

([1]) Politzer. Diseases of the Ear. Translated by James Patterson Cassells, M. D.

in causation of symptoms usually referred to disease of labyrinth.

"In this case I find, from history and *status praesens*, no sufficient evidence of labyrinthine disease, but on the other hand, a condition of fixation of sound transmitting structures of the middle ear, in consequence of the chronic middle ear disease which results in a *permanent degree* of intra-labyrinthine pressure. This is sufficient to interfere with the mobility of the intra-labyrinthine structures to the extent of impairing hearing by bone conduction, (as well as for sounds from without) but is not sufficient, in itself, to *cause* vertiginous symptoms.

"When, however, the intra-labyrinthine pressure is increased by increase of blood flow to and in the labyrinth, the vertiginous symptoms appear, and are accompanied often by increased tinnitus, which, in this case, is purely a circulation sound.

"Therefore Mr. F., 1st. has old chronic middle ear trouble (which requires treatment as in any similar case) and which causes a permanent (permanency limitable by treatment) pressure in the labyrinth.

"Second, by years of hard work, irregular and faulty diet, he has diminished his stock of available nerve force, and is therefore subject to (a) vaso-motor disturbances, which cause occasional and sudden slight intra-auricular congestion, (b) faulty stomach digestion, as shown by his symptoms, 3 or 4 hours after eating, which in its turn disturbs the central circulation and excites his auditory vertiginous symptoms"—and yet in Mr. F's case Rinne's experiment was positive in each ear.

The use of Koenig's rods in testing these cases gives very important data; since, in every case in private practice, in which there has been unmistakable evidence of disease of the labyrinth, there has been a marked diminution of the audibility for the upper limit of vibration of these rods as compared with the average normal ear.

In a letter in regard to a case in which there was disease of the labyrinth on one side, and in which ear Koenig's rod of 20,000 V. S., was not heard, I asked Dr. Blake the following question :—Can there be any considerable affection of the labyrinth when a Koenig rod of 35,000 V. S., is readily perceived?

His reply was as follows :

"To answer the question in your letter : In all the cases of labyrinth lesion that I can remember, that is, including the cochlea, there has been *marked* loss of hearing for the Koenig's rods, but the same symptoms may occur with impaired mobility of the ossicula alone."

Let us compare the average age, duration, ratio of bone to aerial conduction, and the audibility of Koenig's rods in the three series of tests with each other and the normal ear.

	Average Age,	Average duration of disease in years.	Average ratio of bone to aerial conduction.	Audibility of Koenig's rods.
1. Series from Records,	35.5	13	1 to 2.2	R. 35,000 V. S. L. 34,200 V. S.
		Average length of time employed in years.		
2. Machinists,	35.4	12.6	1 to 2.5	R. 40,000 V. S. L. 40,000 V. S.
3. Boiler-makers,	32.1	14.1	1 to 2.4	R. 39,166 V. S. L. 38,541 V. S.
4. Normal ears,	18.7	——	1 to 3.7	R. 46,458 V. S. L. 46,250 V. S.

It will be seen that the average ages in the first three series are nearly equal in years ; that the average duration of the disease in those from my records corresponds to the length of time the machinists and boiler-makers had worked at their respective employments ; that the ratio between bone and aerial conduction diminishes in a corresponding degree to that of the hearing power for the voice, and that the average audibility for the upper limit of

Koenig's rods is quite equal to the average normal of 40,000 V. S., as determined by Dr. Blake, but below the average in my series of tests, probably on account of the great difference in the average ages, for Blake found the younger the person, the greater the audibility for Koenig's rods; therefore, in conclusion of this part of the subject, it seems to me that the deduction must be made that the loss of hearing in the machinists and boiler-makers was due much more to a defect in the *conducting* than in the perceptive part of the organ of hearing, for the following reasons:

1. Because of the past history or present condition of catarrh of the middle ear and naso-pharynx.

2. Because the tuning-fork, when placed vibrating on the centre of the teeth, was heard louder and longer in the more affected ear and the sound of it was increased by pressing on the tragus and closing the meatus.

3. From the fact that had there been any considerable disease of the labyrinth they would not have responded so nearly to the normal average audibility for the upper limit of Koenig's rods, since such an astute observer as Dr. Blake, who has made extensive use of them, has never had a case of labyrinth disease without a "*marked* loss of hearing for the Koenig's rods."

In regard to hearing in a noise, several from each of the three series of tests made a voluntary statement that they could hear better in a noise.

No. 7 of the series of cases taken from my records was positive he could hear better in a noise.

He was tested by the voice, watch, acoumeter, snap of the nails, tuning fork, and Koenig's rods, and the result noted.

Then a noise was made by turning on two faucets of water which ran with considerable force and the tests repeated, without the slightest increase in the hearing power.

On the contrary, he could not hear my voice *at the same tone* as well as when it was quiet.

He was not quite satisfied, for he said the noise was different from that of the cars, but promised to test himself and report, which he did in due time to the effect that he was convinced that it was a relative, not an actual improvement that took place, and that he could not hear a given sound better in a noise.

Case 15 of this series was a lady who was positive she could hear better in a noise. She was tested like No. 7 with the same result and reported in due time to the same effect.

In regard to the machinists, who claimed they could hear better in a noise, I will pass over my tests and give the testimony of Mr. S., the foreman, who has been in this employment 38 years.

He says in substance, that whereas formerly he thought some of the men did actually hear better in the noise of the shop, as they claimed, he now knows from repeated observations that this does not take place.

He says that they learn to ignore or suppress the various noises and blend them all into one, as when carrying on conversation and that any unusual sound, like that of the machinery getting out of gear, will attract attention at once.

As an illustration of this point he cited the fact that when a workman had made a key which imperfectly fitted the holes by which two surfaces are riveted together, and was attempting to make it do by hammering, although this would not be very unlike that of other sounds, yet he could detect it at once in any part of the shop.

His observations confirm mine made during these examinations and answer the questions raised by Dr. Green, of St. Louis, in the discussion of my paper last year, for he says that a machinist who is equally as deaf as a boiler-

maker, does not hear nearly as well in the boiler shop as the latter and *vice versa*, and adds that he can hardly hear conversation as carried on in the din of a Sunday school.

When my investigations were begun with the boiler-makers I was not aware that any observations had been made upon them and did not learn this until Dr. Roosa sent me his paper read before the Medical Society of the County of New York.(1)

Professor Roosa takes exception to the conclusion reached in my paper read before the Society last year, that the loss of hearing in the boiler-makers was "not due wholly to the effects of the concussion upon the nerve, but that it was principally due to the effects of the occupation upon the conducting apparatus of the ear," but agrees with the conclusion that they do not hear better in a noise.

My observations lead me to assert, that, in a given number of cases, there are more boiler-makers, than there are other persons with defective hearing, who claim they can hear better in a noise, and these claims are just as true in the one case as in the other.

Ten years ago upon studying the physiological process of hearing, a doubt came into my mind, whether there could be a condition of the ear in which a noise would improve the hearing, as it appeared to do in myself and others, and I began to make experiments and observations.

It was readily ascertained that the tick of the watch, snap of the nails and tuning-fork could not be heard better in the noise, but to determine whether the voice was or was not heard better in the noise was not so easy a question to decide, and even two years subsequent to this time I could have written a testimony in favor of hearing better in a noise, which I am sure would surpass any that I ever have seen.

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(1)The Effects of Noise upon Diseased and Healthy Ears. Reprinted from the Archives of Otology, Vol. XII, No. 2, 1883.

Yet I am now absolutely sure as I am of anything that my hearing was not actually improved in a noise, and I have satisfied myself that that is the case in those who have made the claim that a noise improved the hearing, now amounting to between one and two hundred that have been examined.

Should one, two or a half a dozen exceptions have occurred, these could only have been "exceptions which prove the rule," as in other cases, for instance, there are persons with normal or nearly normal ears who do not hear the tuning-fork when placed vibrating in the median line of the head better in the ear in which the meatus is closed, yet this does not occur frequently enough to disprove the law first made known by E. H. Weber, that when the external auditory meatus is closed under these conditions, the tone of the tuning fork is heard longer and louder in that ear.

At present, I must coincide with the opinion of Tröltsch(1) that "misapprehension and lack of proper observations are generally at the basis of these statements" in regard to those who make the claim that a noise improves their hearing power.

That this statement may be applied to one whose keen observations and practical knowledge did so much for aural surgery, I will quote from his text book (2) page 279; He says, "I knew an instance of a miller, who could hear perfectly well ordinary conversation while standing within the working mill, but so soon as the mill ceased or that he removed into another locality he could only hear when spoken to in a much louder tone of voice."

This was quoted in a foot note in a paper, (3) in which

(1) Treatise on Diseases of the Ear, Second Am. Edition, by D. B. St. John Roosa.

(2) Wilde on Diseases of the Ear, 1853.

(3) Otitis Media Non-Suppurativa Chronica. Based on the statistics of one thousand Diseases of the Ear observed in private practice.

this subject was discussed, read before the Maine Medical Association in 1880, and commented upon as follows.

He says a satisfactory explanation of this phenomenon has never been given.

It would seem that in this case the statement of the person, or the fact that he did appear to hear better in a noise, was taken without the usual scathing tests instituted, which the great reformer of aural surgery put upon so many sayings and practices, both in and out of the profession, for he must have known that no one would use, for no one "could hear perfectly well ordinary conversation" —not even the speaker—in a noisy place like "the working mill" and that conversation must always be carried on "in a much louder tone of voice" than is used in a quiet place.

THE SIGNIFICANCE OF THE TRANSMISSION OF SOUND TO THE EAR THROUGH THE TISSUES IN AURAL DISEASE.

By Samuel Sexton, M. D., *of New York, N. Y.*

So long as the parts of the ear concerned in sound transmission remain in a normal state, sound may be said to almost exclusively reach the auditory nerve by means of their action, and since impulses of sound are thus practically excluded from all other channels (tissues) of transmission, the confusion which would otherwise arise is avoided.

Disease, however, may give rise to changes in the transmitting mechanism, owing to which vibratory impulses are but imperfectly conveyed in the natural way, *i. e.*, by aërial conduction, and then it is that the auditory nerve takes cognizance of sounds hitherto excluded from it by the peculiar arrangement of the transmitting apparatus; these unpleasant and strangely sounding undulatory vibrations are received through the osseous, muscular, and other tissues.

This altogether anomalous hearing, which may exist for a time continuously, or may be interrupted, as it were, by almost normal hearing, is dependent for the most part on the passage of sound to the ear through both aërial and tissue media at the same moment. Owing to the increased intensity of sound, thus partly heard coming through the better conducting medium of the tissues, an extremely confusing and disagreeable effect is produced, and the definition of an exclusively aërial transmission is wanting.

As is well known to otologists, hearing may thus become a very painful experience; if the patient then hears his own voice autophonously he feels that it has been much altered, or is not intelligible to others; indeed, it seems to be unrecognizable to himself even. The discomfort may be increased, if such a thing be possible where the physical and mental distress is almost unbearable, by the tinnitus aurium arising from the circulatory movements taking place near enough to the ear to be heard. Loud noises, such as the passage of railway trains, street trucks, the action of machinery and the like, owing to the better transmission of their more profound impulses through unaccustomed media of approach, fall upon the nervous centre of audition like a blow and thus give rise to dysacousma.

It being doubtful if the perceptive sense of hearing be increased by labyrinthine inflammation, we may suppose that so-called hyperæsthesia of the auditory nerve consists in the painfulness of the impression made by sound on the perceptive centre. If this be true, inflammation of the perceptive filaments of the auditory nerve in the labyrinth alone would scarcely be expected to increase the hearing power. On the other hand, it would be difficult to determine what degree of labyrinthine inflammation was necessary to impair the perceptive functions. Labyrinthine imflammation, viewed from a clinical point of view, is doubtlessly nearly always consecutive to middle-ear disease, but whether existing independently, or in conjunction with middle-ear trouble, the transmission of sound would be more effectually performed by means of aërial conduction as regards intelligible perception. In middle-ear disease, however, the tuning-fork would be better heard through the tissues inversely to an increasing defect in aërial transmission.

Even if the perceptive apparatus were alone affected the tuning-fork would be best heard by aërial conduction,

since the transmitting apparatus affords the better conduction and at the same time interferes with osseous conduction. But cases of labyrinthine disease alone are rare, and it is difficult to establish the fact that no middle-ear disease coëxists in any given instance.

CONCLUSIONS.

I. When the vibrating tuning-fork, placed on teeth or vertex is better heard through the tissues on one side, it simply indicates that the better ear excludes wholly or in part such (tissue) transmission, but it does not prove that the auditory nerve in either ear is affected.

(Of course, if the nerve of audition be gravely affected, sound will not be heard by any method of conduction.)

II. If the conductive mechanicism is absent or greatly damaged in one ear, while the other remains more or less normal, aërial transmission will be found to be ineffectual in the diseased ear, while the tuning-fork allowed to vibrate as before will, therefore, be best heard in the diseased ear, and its vibrations will be almost entirely excluded from the healthy ear.

III. In deafness from labyrinthine disease, pure and simple, the middle ear being normal, the tuning-fork would be best heard, if heard in any degree, by aërial conduction, because bone conduction would be excluded.

(In those extreme cases where destructive disease of the nerve has taken place, impulses of sound may be appreciated irrespective of either the transmitting or labyrinthine structures; thus the deaf-mute is conscious of the sound of thunder, artillery, drums, stamping with the foot upon a floor, and the like.)

IV. If the above deductions be true, we may conclude that the tuning-fork is of less value than has been supposed in the differentiation of aural disease.

NOTE.—The author has expressed his views more fully on this subject in the following papers :—

I. Hearing by the aid of Tissue Conduction—the Mouth Trumpet and the Audiphone. American Journal of Otology, vol. II. pp. 114-119.

II. Note on Tinnitus Aurium. The British Medical Journal, June 26, 1880.

III. On False Hearing and Autophony in Singers, Speakers, and Performers on certain musical instruments. N. Y. Medical Record. vol. xix. Jan 22, 1881.

Dr. Sexton stated before reading his paper that of course it was understood that by tissue conduction was meant the passage of sound waves to the ear through any of the structures of the head, as integument, muscle, bone, etc.

He remarked in referring to a paper which had just been read that several years ago he had made experiments with Koenig's rods and that he did not value them any more highly than the tuning-fork as a means of differential diagnosis.

DISCUSSION.

DR. C. H. BURNETT, of Philadelphia, said that the entire unreliability of the answers of the patients had been the greatest obstacle he had observed in making observations in this direction. He wished simply to state that his experience had practically been very similar to that of Dr. Sexton, and his conclusions were nearly the same. He also had felt the increasing want of reliance in the tuning-fork, because he was unable to rely upon the answers of the patients.

DR. HOLT could not agree with Dr. Sexton, in regard to the unreliability of Koenig's rods, since, unlike the test with the tuning-fork, any want of accuracy on the part of the person examined can be readily detected. By having the loops by which they are held opposite the ear, the proper length, the vibrations of the rods can be controlled

by the fingers, and excluding vision and the fellow ear this becomes as positive as any test in medicine. Furthermore, such a good observer as Dr. Blake, has never seen disease of the labyrinth, without a "marked loss of hearing for the Koenig's rods."

Dr. Andrews had found, as a rule, that, when a sound ear is closed the vibrating fork on bones of skull or teeth is better heard, than when the ear is open.

Dr. Sexton said, undoubtedly, for under such circumstances the aërial conduction is improved.

Dr. Kipp, of Newark, said he was entirely at a loss with regard to statements made by patients concerning hearing a tuning-fork, and had during the last few years placed less and less reliance on it as a means of differential diagnosis. Some years ago, he had a patient with acute disease of the middle-ear in which he made an incision into the drumhead, inflated it, and nothing escaped, and when the tuning-fork was used, the patient claimed that he could hear it as well in that ear as in the other, and the same thing had occurred to him again and again. He had found that in cases of syphilitic deafness the statements of patients were so unreliable that he could not place any confidence in them.

THE RECOGNITION OF CEREBRAL COMPLICATION IN AURAL AFFECTIONS, BY MEANS OF THE OPHTHALMOSCOPE.

By J. A. Andrews, *Staten Island.*

Case I. Otitis Media Purulenta Chronica. Abscess of Middle Lobe of Cerebrum. Death.

G. J., house painter, æt. 24, had scarlet fever when 12 years old, since which time he has had more or less purulent discharge from his ears. While descending a ladder, Dec. 18, 1878, pain developed suddenly in his right ear and corresponding side of the head. On reaching home, he went to bed; during the night he vomited; he thought it was an attack of fever and ague. Next morning he was dizzy and vomited. Took gr. xv. of quinine in the morning; at noon he felt worse and sent for his physician, who prescribed Kalium brom. for the head symptoms, and ox. cerium for the vomiting; in evening, of the same day, the doctor's attention was attracted to the patient's ears, because of pain referred to depth of right ear. Temperature, 103°, pulse 100, resp. 30 per minute. I saw patient three days subsequently: he was conscious and talked intelligently. H. D. R. E., watch ad concham; acumeter 1″; L. E., watch ad concham; acumeter 4″; quite deaf for conversation. R. E., slight purulent discharge; drum membrane has a small perforation in its antero-inferior part; calibre of external auditory canal much lessened in consequence of swelling of its lining tissues. L. E., no discharge; no evidence of active disease in this ear. *Double optic neu-*

ritis. R. E., counts fingers at 6 feet: L. E. V., $\frac{20}{70}$. Dec. 24th, saw patient at 9 P. M.; two hours previous to my visit his condition had assumed a marked change; the pain in the right side of the head was intense; he vomited; temperature 101; pulse 110 and very feeble; he was drowsy, and passed his urine involuntarily; easily roused from drowsy state, when he conversed rationally. Dec. 25th, 2 P. M., patient died in coma. No paralysis, no convulsions.

Autopsy: Right external auditory canal filled with healthy looking pus. Extending from the tympanic portion of the glasserian fissure outwards into the external auditory canal for 4 mm. but not involving the ossicles, the bone was ulcerated. The communication with the brain was made at the point of ulceration just referred to, this being effected through a small fissure in the centre of the ulcerated bone. The dura mater overlying the ulcerated bone was also ulcerated and separated from the bone by offensive-smelling pus; pia mater congested and numerous ecchymotic foci; the middle and anterior fossæ contained pus; brain normal in consistence. Encysted abscess in middle lobe of cerebrum; brain surrounding abscess œdematous; sinuses and internal ear normal. These conditions refer to the right side of the brain. The left temporal bone was not dissected, but there were no changes in the meninges overlying the temporal bone on this side.

Patient's mother informed me that two years after the scarlet fever he took cold in his ear and suffered a great deal with his head. He had headache at times for several years. Inasmuch as the abscess was encapsuled, and death occurred a few days after the developement of cerebral symptoms, we may justly refer the interval of ten years between the attack referred to by his mother and Dec. 18, 1878, or the period of latency.

The above case is an exception to the law which Toynbee endeavored to establish, i. e. that each of the centres of the ear had its particular division of encephalon to which it communicated disease: inflammation of the meatus audi ext. extending to the lateral sinus and cerebellum.

Case II. Otitis Media Purulenta Chronica; Optic Neuritis: Phlebitis Sinus Lateralis Dextra; Meningitis of Convexity. Death.

P. H., æt. 42, clerk, had had purulent discharge from both ears, for eight years, which had never been treated. Three years ago, there appears to have been an acute exacerbation and he was treated for inflammation of the brain, but the ears received no attention. Since this attack, patient states that he has enjoyed good health, but on close questioning, I elicited the fact that for some time after the acute exacerbation referred to, he had headache which was generally so slight that he did not think it was "significant." July 5, 1879, I was requested to see him. He had been confined to the house for two weeks, during which time he had been very irritable, and had severe pains in the head; the headache was diffused and at times, referred to the right side of the head. There had been no paralysis, nor convulsions, but he vomited during first week of his present trouble. For first two days he had illusions and delirium; temperature had not been above 100.5° F. On occasion of my first visit, I found patient suffering with severe diffuse pain in the head; purulent discharge from right ear: discharge very offensive; removal of the discharge revealed bottom of the canal filled with granulation tissue; right optic neuritis; left disc hazy, veins large and dark colored, but not tortuous. R. V. $=\frac{20}{200}$; L. V. $=\frac{20}{50}$. Intensely sensitive induration extending in course of right internal jugular vein.

July 6th, swelling of the neck very marked: face puffy. Right processus mastoideus not sensitive to the touch, but patient was rendered dizzy and confused by a light tap on this part. Chills four times during day.

July 7th, the right mastoid was entered, no pus found but there was a sharp hemorrhage which stopped spontaneously. He expressed himself as relieved by the operation and slept for three consecutive hours after it.

July 8. Puffiness of the face much diminished; temperature at 9 A. M., 101.3° F.; pulse, 95; respiration, 20 per minute: 2 P. M., temperature 103° F.; pulse, 95; respiration, 26 per minute: 9 P. M., temperature, 104.2° F.; pulse, 110; respiration, 32 per minute.

July 9th, suddenly he became unconscious, and death occurred in coma. No convulsions.

Autopsy: All the sinuses contained some fluid blood; right superior petrosal and lateral sinuses contained red coagula, loose in superior petrosal but adherent in lateral sinus. The venous wall of lateral sinus on right side is thickened, its surface brown in color and the bony wall separating the sinus from the mastoid cells is ulcerated at three different points at which offensive smelling pus was seen between venous and perforated osseous wall. Right internal jugular vein contained a disintegrated thrombus. The tegmen tympani was very thick. The dura mater covering tegmen tympani and the adjacent portion of bone on right side was deeply congested, and numerous small red points (hemorrhages) were seen. This condition was confined to the parts just mentioned, and was not evident in any other part of dura mater. Subarachnoid space and meshes of pia mater covering convexity of cerebral hemispheres and upper surface of cerebellum contains a moderate amount of sero-purulent exudation: the exudation extended down sides of brain and most abundant on right side, but at the base of the brain it was less abundant. The mucous

membrane of tympanic cavity was swollen, tumefaction extending into the mastoid cells.

Case III. Otitis Media Purulenta Chronica: Meningitis, Optic Neuritis. Recovery.

J. E., Æt. 19, has had purulent discharge from left ear for eighteen months. Short and stout in stature, strumous scars on face directly in front of left ear, also on neck of corresponding side. Right ear has never discharged. He had never been under treatment for his ear trouble The discharge from the ear has been profuse until about a week ago, since which time it has been scanty. I saw the patient Nov. 16, 1880, six days after the development of threatening symptoms. The left ear contains a large polypus springing from the superior surface of the external auditory canal, at about junction of its cartilaginous and bony portions. Removal of the polypus, which was very vascular and had a broad attachment, showed the bone beneath to be exposed and rough. There were also two polyps springing from the tympanic cavity; these had such a slender pedicle that they came away while the snare was being applied; their removal revealed pulsation at the bottom of the canal, and after repeated efforts with the catheter pus was blown through the perforation in the membrana corresponding to the point where the pulsation was noted, but owing to the swelling of the canal the perforation could not be seen.

Pharynx very much congested, and secreting thick mucus. Left membrana tympani was incised, considerable pus coming away, much more than was expected from the appearance of the drum membrane, which did not appear bulged forward in any part that was visible. Mastoid process red and painful. Severe headache: the pain is general, but at times it is most severe on left side of head and in

forehead. Temperature 101° F.; pulse 85 per min. He is very restless; he vomited half an hour before I visited him. He complains of not seeing a certain picture on the wall. Left eye marked optic neuritis: right eye, retinal veins enlarged but not tortuous, disc very red but not œdematous; no other change in fundus.

An incision over left mastoid showed the bone to be inflamed but firm. No improvement followed this operation and thirty-six hours subsequently the mastoid was bored into; a small amount of blood with a trace of pus escaped from the opening. The cortical plate of the mastoid was very thick. A warm solution of Kalium permanganatis injected into the external auditory meatus readily escaped through the opening in the mastoid, which passage I keep free by means of a draining tube. There could be no doubt in regard to the immediate result of the operation. He recovered from the influence of the ether rapidly, and in half an hour afterward fell into a quiet sleep which lasted for nearly four hours. On awaking there was less headache, and patient asked for some warm milk of which he partook with relish.

Nov. 18th, patient passed a quiet night; his sleep was interrupted, but he did not suffer from pain in the head. Temperature 100° F.; pulse 80 per minute. There is a free discharge from mastoid. I did not examine patient's eyes the morning following the opening of the mastoid, but I did so on the morning of the fourth day, after the operation. The left disc was less œdematous and the veins less full and not so dark looking, but the improvement was not striking.

Dec. 6th, patient has been steadily improving; there is only occasional headache and then very slight. There is a marked change in the appearance of the left optic disc; it is only slightly obscured, but the retinal veins are still fuller than normal. The right disc is now swollen and the

veins are large and tortuous. Patient passed from my care in Feb., 1881, about two months and a half after the begining of the trouble. The left optic disc was then hyperaemic, the veins much less in size than when seen two weeks previously; the opening in the mastoid was closed. There was still a slight discharge from the ear. Right nerve is still somewhat obscured, but its improvement is very manifest. The patient was absent from New York until May 2d. I saw him on the 4th; the discharge had ceased since March. The left optic disc appears normal (?), the right disc is slightly hyperaemic. R. E. V. $=\frac{20}{30}$; no improvement with glasses; L. E. V. $=\frac{20}{30}$; right visual field normal; left visual field slightly contracted.

I have intentionally omitted many of the details of this case, and record only what I considered the essential features. The diagnosis of cerebral complication was believed to be confirmed by the ophthalmoscopic examination. I saw the patient for the last time in Dec., 1881. At that time there was, I thought, no abnormal change in either fundus, but the visual field of the left eye, therefore, on the same side as the ear affected, was slightly contracted.

Case IV. Otitis Media Purulenta Chronica; Abscess of the Brain. Death.

In the early part of the summer of 1879, Mrs. K., æt 31 years, consulted me on account of distressing subjective noises in her right ear, and difficulty of hearing. At the bottom of the right external auditory canal were two medium sized polypi; immediately in front of these growths the posterior and superior surfaces of the canal were ulcerated for a considerable extent outwards. The left drum membrane presented the appearance of having been the seat of a perforation. She stated that she had had a pur-

ulent discharge from the right ear for about thirteen years: there had been a discharge from the left ear, but this had ceased spontaneously after a few weeks' duration. She suffered pain at times in the right ear. I advised the removal of the polypi; but when she was told that the discharge from the ear would not stop so long as the growths were allowed to remain, she seemed rather agreeably surprised, and said: "Why, I have always been told that it was not right to stop a running ear." She further told me that during the past winter she had lost her young son, then living in New Jersey, who was said to have died of inflammation of the brain. I asked if he had had any ear trouble, and she replied, "only a running." This had followed scarlet fever and had, at the time of his death, existed nearly two years. "But," she said, "I was advised to let it alone." In regard to her son's condition just before death, I elicited the following: "The boy complained of pain in his head [ear?] for several weeks before his death; he was unconscious for three days before he died; a blister was applied behind his ear, but this part [mastoid?] was so sore that polutices were ordered." This case seems plainly to have been one of middle ear disease, terminating fatally from extension to the brain.

Mrs. K. consented to the removal of the polypi, and this was followed by quite active inflammatory reaction, which, however, was promptly subdued by local depletion, etc. There were no visible changes in the optic nerve. After eight days' treatment, she went to Chicago: I therefore lost sight of her until soon after her return in Nov. 1879.

Dec. 2d, I was requested to see her. On her way from Chicago, three weeks before, she took a severe cold; she had had almost constant pain in the head for upwards of two months, especially severe for the past five days, and was referred to the right side of the head. Facial paralysis had occurred on the right side, and there was vertigo.

I found her suffering violent pain in the right side of the head, and at the depth of the right external auditory canal; offensive purulent discharge escaped from the right ear. Vomiting; temperature 102.8°F.; pulse 95. Mastoid not tender on pressure, nor does percussion cause vertigo or pain. There is beautifully developed neuro retinitis in right eye; no changes in left eye; counts fingers at about ten feet with right eye.

5th, Patient is delirious. 7th, patient comatose, no convulsions. She died after having lain in coma for six hours.

Autopsy: Corresponding to the point of ulceration in the external auditory canal, referred to above, a sinus was found extending into the antrum mastoideum. The roof of this cavity was destroyed by caries; pus to the amount of half a fluid ounce lay upon the carious bone. The dura mater overlying this collection of pus was very much thickened, but not perforated. In the right hemisphere of the brain a large abscess was found, filled with greenish, thick pus; the surrounding brain substance was œdematous, but not disorganized; the abscess was encapsuled, but had ruptured into the brain, in all probability only a short time before death. The sinuses contained dark colored blood, but no clots. The right lateral sinus was unchanged.

The foregoing cases have been presented, not because they exhibit any remarkable or unusual features that have not already received notice in literature, but they are offered more with the intention of eliciting discussion on a subject bearing upon which the writer does not find much satisfactory data in literature.

The cases of cerebral abscess tabulated by Gull, Rudolph Meyer, Wreden, Lebert and others, furnish no facts which enable us to judge of the frequency or actual pres-

ence of signs of intra-cranial disease by the appearance of the fundus oculi. In the majority of instances in which reported cases of cerebral diseases, secondary to an aural affection, appear in literature, the eye is merely incidentally alluded to, i. e., the state of the pupils, the presence of photophobia, or the condition of the sight. In many instances the question of an intra-ocular lesion was dismissed with the observation that the vision was $\frac{20}{20}$. The writer believes that most ophthalmologists will endorse the statement that optic neuritis and central vision $\frac{20}{20}$ are not incompatible. I have seen such cases, and I have now under my notice the case of a physician with advanced atrophy of the optic nerve, and central vision $\frac{20}{20}$, but whose visual field is very much contracted. Then again, when the ophthalmoscope has been used, the record reads: "One or both optic discs appeared obscured and the vessels enlarged." Now the writer believes that it is just such cases that should excite our suspicion of an intra-cranial complication in ear disease—especially purulent otitis media—in which other signs of extension of the trouble to the brain are obscure.

To what extent, in the cases under consideration, a slight *œdema* of the *optic disc* should influence our mode of treatment, in regard to an operation upon the mastoid is, in the absence of sufficient evidence, necessarily an open question; but from a careful study of cases in which the mastoid has been opened, the operation does not appear to be a dangerous one when intelligently performed; and the writer would, without waiting for pronounced neuritis, accept the condition of the œdema of the optic disc in the cases under discussion, as an indication for opening the mastoid; and if not with the expectation of liberating pus, at least to establish free drainage from the middle ear; the procedure is certainly consistent with a good surgical principle and is not likely to add to the preexisting mischief.

Not until quite recently has attention been directed to the importance of examining the fundus oculi in aural affections. Allbutt, Kipp, Knapp and Zaufal are the pioneers in this valuable work of furnishing evidence of the importance of an ophthalmoscopic examination in the class of cases under consideration. Albutt* and Kipp† have each reported two cases of otitis media purulenta with optic neuritis, in which recovery took place, and Zaufal‡ has also recently recorded a case of a student æt. 16, with purulent otitis media, and optic neuritis, which latter condition was observed to rapidly recede after trepanation of the mastoid, and the patient made a good recovery.

Acute otitis media does not commonly prove fatal; the pain in and about the ear often being so intense as to almost completely obscure the symptoms of any brain complication which may exist. The patient generally recovers from the acute symptoms, and there may remain impaired hearing and a purulent discharge from the ear, which latter may continue, if not treated, for weeks and months, and even years, when an acute exacerbation occurs and the patient dies with the post mortem evidence of abscess of the brain; the abscess, in many instances, having been formed at the time of the first attack of ear trouble, some years previously. This was evidently the fact in Case 1, cited above; however, this is not an isolated case. Otological literature abounds with records of cases of cerebral abscess, which exhibited a long period of latency. In acute abscess there is, as a rule, little or no period of latency, and the disease ends fatally in a few days, the abscess in such cases not being encapsuled. Meyer§ states that the earliest appearance of a capsule is at

*Thomas C. Allbutt. On the use of the ophthalmoscope in disease of the nervous system and of the kidneys, etc., pp. 322, 323, 324.

†Archives of Ophthalmology, vol. viii, pp. 75 and 148.

‡Weiner Med. Presse, 1881, No. 46, p. 1452.

§ "Zur Pathologie des Hirnabscesses," Inaug. Diss. Zürich.

six or seven weeks, and Huguenin demonstrated distinct evidence of the capsule not earlier than twelve weeks. The chronic abscess is characterized by a prolonged period of latency, which intervenes between the early congestive stage and that of the development of the purulent formation. Often the latency is interrupted by a slight degree of headache, which symptom obtains in Case 1, and is often confounded with digestive disorders, and escapes scrutiny on that account. The duration of the latency varies from a few weeks to several months.

As far as I have been able to ascertain, the longest attested duration of brain abscess is that case observed by Härlin,* in which the traumatism occurred twenty-six years before death. In another case recorded by E. Schott,† abscess of the brain followed an injury sustained twenty-one years before. In the first case cited in this paper, the abscess had, in all probability, existed ten years. The period of latency once being disturbed, the end of the disease is soon reached. Headache was the initial symptom in two-thirds of Meyer's cases of abscess of the brain, therefore somewhat more frequent than in brain tumors, where according to Ladame,‡ it ushered in the phenomena of the disease in one-third of the cases.

The intensity of the headache varies greatly: in one case it is almost unnoticeable, in others it excites excessive complaint by the patient. Generally it increases with the duration of the disease, and is more continuous and occurs less in paroxysms than the headache of brain tumors. The headache is sometimes accompanied with fever, but this is very often absent, even in the terminal stage. A case reported by R. Deutschmann, in a recent number of Graefe's

*Quoted by Bruns, "Handbuch der Chirurgie."

†Ueber Gehirnabscess. "Würzburger med. Zeitschr. ii, p. 462.

‡"Symptomatologie und Diagnostic der Hirngeschwülste Meyer, op. cit."

Arch. für Oph. (Bd. xix, Abth. i, 1883, p. 292) is a striking illustration of this fact. The case was one of abscess of cerebrum with choked disc; meningitis basilaris and perineuritis, also neuritis interstitialis optica, but at no time elevation of temperature. We find vertigo, and less frequently vomiting and seldom convulsions or paralysis. It is a significant fact in connection with cerebral localization, that *the principal seat of abscess of the brain, secondary to ear disease, is in the medullary substance, seldom in the cortex;* which fact may account for the absence of certain nervous phenomena in these cases.

In regard to the clinical phenomena of *thrombosis of the transverse sinus*, the symptoms of a painful œdema over the mastoid of the affected side, to which attention was first directed by Griesinger, *is* of diagnostic value. Schwartze (Arch. für Ohrenheilkunde, vi., p. 219) considers this symptom unreliable, but Wreden confirms the œdematous swelling in the region mentioned as a symptom of phlebitis of the lateral sinus, and the cases reported by Rammel, Kolb, Taylor, Moos, J. Orne Green, and others, support Griesinger's view. However, this symptom is not a constant one.

Phlebitis of the cavernous sinus declares itself by a congestion of the vein which empties into it, the ophthalmic, and its branches. As the result of this congestion there is œdema of the eyelid, conjunctiva, forehead, and nasal mucous membrane, entoptic phenomena, and diminution of sight. (Wreden.*) These symptoms may, in the beginning of the disease, exist on one side only, but this will only be for a short time, since the disease soon spreads to the corresponding sinus of the opposite side. Congestive papilla alone would not necessarily furnish us with positive evidence of the *locality* of the obstruction since Sesemann†

*St. Petersburg med. Zeitschrift, xiii.

†Emil Sesemann "Die Orbitalvenen des Menschen und ihr Zusammenhang mit den oberflächlichen Venen des Kopfes." Arch. f. Anat. u. Physiol. u. wissenschaftl. Med., 1869, p. 159.

has shown that the superior and inferior ophthalmic veins do not empty the largest quantity of their blood into the cavernous sinus, but into the facial veins; therefore, when symptoms of obstruction show themselves, viz., œdema of the eyelids, fullness of the frontal veins, and exophthalmus, they are to be explained, not by a simple thrombosis of the sinus cavernosus, but by the presence of thrombi at the same time in the ophthalmic and facial vein.

The internal carotid artery, surrounded by the sympathetic plexus, and the sixth nerve, pass through the cavernous sinus, and the third and fourth nerves and the ophthalmic division of the trigeminus are found on its outer wall. We can, therefore, readily anticipate the local phenomena which would be developed in consequence of pressure of the inflamed sinus upon these nerves.

An inflammation of the *cavernous sinus*, is, in the majority of instances, accompanied by meningitis, and writers have heretofore attributed the phenomena of an affection of the oculo-motorius to meningitis: but Wreden describes two cases of phlebitis of the cavernous sinus (l. c., cases 9 and 10, pp. 95-96), which, notwithstanding the absence of meningitis, showed familiar signs of irritation and paresis in the areas of the oculo-motorius and other cerebral nerves. Symptoms of disease in the region of distribution of the trigeminus, occurring in phlebitis of the cavernous sinus declare themselves most frequently in irritation and paresis of the ophthalmic branch; the second and third division of this nerve show these symptoms only exceptionally. Irritation of the ophthalmic branch gives rise to one-sided headache, sometimes sharply circumscribed, its greatest intensity being in the *forehead* and over the eyes.

Wreden's cases seems to invalidate Griesinger's (Arch. d. Heilkunde iii, p. 446) declaration that the headache is due not to the affection of the sinus, but to the concomitant meningitis. Fixed, one sided, circumscribed headache is,

consequently, of differential diagnostic value in an affection of the cavernous sinus, because it proves irritation of a single branch of the trigeminus; while *diffuse* pain, spread out over the whole half of the head, speaks more in favor of the coexistence of meningitis of the median cranial fossa, whereby the second branch of the trigeminus (before its passage through the foramen ovale,) or even the Gasserian ganglion, is involved.

Phlebitis of the superior longitudinal sinus is characterized by repeated and violent hemorrhage from the nose, which Wreden considers very significant when accompanied by epilepti form convulsions. This latter symptom is referred to capillary hemorrhage in the cortical substance of the posterior cerebral lobes, produced by obstruction to the venous circulation of the surface of the brain. (Wreden).

Phlebitis of the superior petrosal sinus, although producing no very characteristic symptoms, would give rise to great congestion in the labyrinth of the ear, with subjective noises and deafness, which is explained by the fact that the veins of the labyrinth terminate in this sinus.

In Phlebitis there is almost always a marked febrile movement and pyæmic symptoms are the rule in this condition. In Case ii cited above, chills were frequently repeated, and the temperature rose rapidly and with very slight remission. In Wreden's case of phlebitis of the cavernous sinus the initial stage was very short. On the first day the temperature rose and without remission to a morning temperature of 102.2° F., and gained in a few hours the maximum of 103.82° F. Such a sudden rise of temperature to a height of 39°—40° C., and more, immediately on the first day, Wreden considers particularly characteristic of the beginning of the fever of an encephalic complication in purulent ear affections. Another valuable point in the differential diagnosis of the initial

period of the fever of encephalic complication, in inflammation of the ear, is that it rarely begins with a chill, even when, as Wreden observed in one case, the temperature was 104.18° F.; whereas in the fever of phlebitis of the cerebral sinuses and meningitis diffusa, usually, the reverse is the case.

It is of importance that all cases of ear disease, with suspicious but obscure symptoms of a cerebral complication, should receive a careful ophthalmoscopic examination and efforts be made to determine its value as an aid to diagnosis in the disease under consideration, and also to ascertain to what extent it should influence the treatment of the ear affection.

In Case iii (the writer's), the cerebral lesion was on the left side; the left eye was the first to become affected, and the first to recover (in the sense that there was no visible change in the optic disc or fundus oculi) and yet its sight alone was impaired. Mr. Nettleship has recently alluded to two cases, (they are not reported in full) in one of which a tumor in the posterior inferior part of the right anterior lobe, occasioned severe pain, chiefly on the right side of the face and head with simultaneous double papillitis, with early extreme defect of sight in the right eye, but no failure of vision in the left eye till a year later. In the other case, the only lesion was softening of the under surface of the left frontal lobe, with atrophy of the left nerve. There was rapid blindness of the left eye without changes, and papillitis of the right without failure of sight. The left disc slowly became atrophied, the right recovered.

From the few accumulated facts it appears that the sight is most affected on the side of the lesion: and that papillitis with other symptoms of brain involvement is valuable corroborative evidence, and we also have some proof in the few cases of recovery after neuro-retinitis and other signs of brain disease secondary to an ear affection, that the optic

disc is, so to speak, a sort of indicator for the condition of the brain. But in the present state of the vexed question of the cause of the papillitis, it cannot be said that it tells us much of the locality of the cerebral lesion. Von Graefés' view of venous stasis and the theory of vaso-motor disturbance, are not supported by post mortem evidence. Prof. T. Leber has more recently advanced a plausible view that the essential part of the transmission is taken by effusion of fluid into the sheath of the nerve, which did not act by simple mechanical pressure, since its quantity was often small, but by its phlogogenic properties. Leber, therefore, explains the origin of papillo-retinitis in cerebral diseases by assuming that the intra-cranial inflammation produces serous effusion which passes into the optic nerve sheath, and excites irritating action on the papillæ and neighboring parts of the eye.

DISCUSSION.

Dr. C. J. Kipp, of Newark, N. J., had published a number of cases, and so also had Dr. Knapp published cases since.

Dr. Andrews regretted his omission to mention Dr. Kipp's and Dr. Knapp's cases, and it came from the fact that although he examined the literature quite thoroughly, it was the more recently published reports, and thus far he had found the condition of the eye only incidentally mentioned in the majority of cases.

Dr. W. W. Seely, of Cincinnati, thought it probable that the experience of ophthalmologists had not been generally reported in the literature upon this subject. Ever since Zaufal drew attention to these cases he had made more or less investigation, and had examined all his cases of suppuration of the middle ear with the ophthalmoscope and with negative results. He thought that such examina-

tions, thus far, had not led to definite results. There are cases in which the fundus gives indications of change within the cranial cavity, but as for their being of special diagnostic value, he thought insufficient had been acquired, as yet.

Dr. Kipp said that he published his cases before Zaufal's article appeared.

Dr. H. Knapp, of New York, said that Dr. Kipp was really the first to mention the subject.

Dr. Andrews was obliged to Dr. Seely for his remarks, and said that his chief object in bringing the subject before the Society, was to elicit discussion and call out references to cases which had not been reported, as well as those which he had overlooked in looking up the literature of the subject.

Dr. G. Strawbridge, of Philadelphia, had carried his investigation a little further, and, since Dr. Roosa directed attention to the subject at Newport, had had the urine examined in all his cases of purulent middle ear disease without brain complication. He had not reached any satisfactory result from examination of the eye, but concerning the urinalysis he had frequently found quite large quantities of albumen; the exact percentage he could not recall. He regarded brain complications in middle ear troubles as comparatively rare. He had no doubt, when brain complications were developed that changes in the eye existed; but in simple purulent inflammation of the middle ear as ordinarily seen, he had not recognized any peculiar change.

Dr. Kipp said that he had continued his investigations since the publication of his cases, and as he recollected, without being able to give the exact figures, the number of cases in which eye symptoms were found was very small, and as he recollected also, brain complications were rare. In cases in which meningitis is present we almost always

find something like optic neuritis; something between oedema and actual inflammation of the nerve. But the changes to be noted in the eye have been claimed only for those cases in which there are brain complications present.

Dr. Andrews said that he did not allude to purulent cases with brain complications unmistakably developed, but to those cases in which the existence of central lesion is suspected. Of course not every case of purulent inflammation of the middle ear presents eye symptoms. He examined the urine in all his cases and with negative results.

Dr. Seely said that is where the difficulty is in making examinations of the fundus oculi. In one or two cases he had seen congestion of the papilla in the eye on the side corresponding to the ear disease, but all the eye symptoms passed away. He did not doubt, at all, that the doctor's position was entirely correct, and that if absolute inflammation exists within the cranium, more or less evidence of it can be obtained by examining the fundus oculi. He intended to speak more particularly on the general subject of suppuration of the middle ear. Of course, also where brain complications actually exist, the ocular symptoms are not so important, because the disease can be recognized in other ways. To repeat, he had seen two or three cases in which there were marked changes in the eye on the side affected by the ear disease, but they passed away, and he was left in doubt whether or not there was very much affection of the brain.

Dr. Andrews said there was one peculiar feature in his cases, also noticed by others, namely, that the eye trouble was most marked, the impairment of vision was most distinct on the side where the disease of the ear existed.

Dr. McKay, of Wilmington, Del., reported a case of chronic meningitis last year in which there was optic neuritis, and had a similar case to report this year.

Dr. Kipp said that Dr. Seely's remarks seemed to imply that reactions from meningitis are rare, and he asked Dr. S., if, from the fact that the optic neuritis passed away, he inferred meningitis did not exist?

Dr. Seely replied, not by any means.

Dr. Kipp said it was well established that optic neuritis might exist as the result of ear trouble and the symptoms pass away entirely.

Dr. E. Bartlett, of Milwaukee, Wis., said he had been much interested in ophthalmoscopic examination in brain disease during the last two years, from the fact that one of his own family had had melancholia, and he had examined the eyes in this case, and also in many others, repeatedly. He believed that in a great majority of cases of meningitis the ophthalmoscope gives decided results, and in both eyes the same. He regarded the examination as of great value in this respect—namely—when there is acute meningitis, or the disease is in its acute stage, the ophthalmoscopic appearances are very decided. A slight cloudiness, etc., of the fundus indicates that degeneration of the brain has not yet taken place; but when degeneration has begun, the appearances in the eye disappear, and the appearance of the eye is as if cerebral disease had entirely passed away; the sight improves, etc. So for the alienist it is a matter of great importance to make ophthalmoscopic examinations.

Dr. Samuel Sexton, of New York, said that those of us who confine ourselves to researches concerning the ear, are obliged to rely upon the experience of others upon this subject, and he would therefore ask whether or not the opthalmoscope had been found of service as a means of diagnosis where other symptoms have not been prominently observed?

Dr. Kipp had examined many hundred cases of otitis media and had not found a case with eye symptoms in

which there was not also other evidences of brain disease.

Dr. Sexton said that he alluded more particularly to cases of meningitis and cerebral abscess.

Dr. Knapp thought that in some cases the ophthalmoscope gave the most valuable objective signs, and he had obtained this evidence in cases in which pain and other subjective symptoms had existed for some time without giving rise to a satisfactory diagnosis; in one case in which he was granted the opportunity to make a post-mortem examination, a case which he had already published, the change in the eye occurred only when the fatal symptoms began to manifest themselves. It was distinctly seen in that case that the œdema was very slight, but as soon as the brain symptoms became severe and pointed towards a fatal result, the eye lesion became prominent, the optic disc was much more swollen than formerly observed, first upon one side and then upon the other. Again the recession of the ocular symptoms had guided his consent concerning removal of the tent and permitting the opening to close after perforation of the mastoid. The recession of the ocular symptoms, marked diminution in the swollen condition of the optic disc, etc., had enabled him to prevent leaving the mastoid cavity open too long after having been trephined. It is not at all necessary to keep up the syringing and drainage from the mastoid cavity until the suppuration has completely ceased; and it is in just these cases that the ophthalmoscope has been of great value.

Dr. Sexton asked Dr. Knapp if he referred to inflammation of the mastoid cells.

Dr. Knapp said yes, suppurative disease of the mastoid with cerebral symptoms, headache, fever, convulsions; when an opening was made in the mastoid, followed by a discharge of pus, and cheesy material was scraped out it brought about an important change in the condition of the patient. After this there comes a period of healing which

lasts, on an average, about *nine* months, and it is quite important to have some indication to guide us in determining when the perforation in the mastoid may be permitted to close. When the optic disc gets normal, the discharge from the mastoid is slight, he thought the opening could be allowed to close. In this way he had abridged the healing period materially, and this is desirable, since the introduction of any substance whatever into the mastoid is attended by danger.

Dr. Sexton said he raised the question because his experience had been so different from that expressed in these so-called brain diseases, or cases in which symptoms had existed that are usually referred to the brain. It had not been his lot to see so many of these cases where opening the mastoid had seemed to be required as had been referred to by others, and he would venture to think that in many cases in which the mastoid had been opened the symptoms of eye trouble had been produced by sympathetic irritation other than disease of the brain. He was glad to get the observations of Dr. Knapp and others.

Dr. Knapp thought it was generally regarded that the observations concerning the eye symptoms were of importance.

Dr. Sexton asked if there was any way of differentiating between meningitis and purulent inflammation of the cells of the mastoid process by ophthalmoscopic examination.

Dr. Knapp thought that when the ophthalmoscope shows neuro-retinitis the inflammation is not in the mastoid cells. It is also a guide with reference to closing the opening. The subjective symptoms are capable of different explanations.

Dr. Strawbridge asked if all meningeal cases showed optic neuritis.

Dr. Knapp said not at all, but when optic neuritis exists it must have been produced by extension of the inflam-

mation to the brain, and indicated a diffuse existence at least.

Dr. Seely said that absolute optic neuritis might be found, and also cases in which there was merely congestion of the papilla, without absolute inflammation. He would ask if the latter condition indicated changes in the brain.

Dr. Knapp said that the presence of these conditions indicates changes in the brain, and their disappearance also indicates the disappearance of the brain complication.

Dr. Seely was inclined to think that the congestion might possibly arise without the presence of disease of the brain itself. He thought it would not be difficult to comprehend such a condition. He should agree with Dr. Knapp that brain disease of some sort was present if there were inflammation of the optic nerve. In the milder manifestations, merely a certain amount of congestion of the optic nerve might be produced through the lymphatic communication.

Dr. Kipp had not seen hyperæmia, such for example as noted in choroiditis; but the condition was more like œdema. The condition had not been simple hyperæmia in the cases he had observed.

The Chairman here observed that the discussions seemed to drift more generally towards the existence of brain complications in mastoid disease, and since there were other papers on the bulletin treating of mastoid disease, he called for the reading of these papers, after which the discussion would be continued.

ACUTE DESQUAMATIVE INFLAMMATION OF EXTERNAL AUDITORY CANAL, ACUTE PURULENT OTITIS MEDIA, MASTOIDITIS AND CHRONIC MENINGITIS—RECOVERY.

By Read J. McKay, M. D., *of Wilmington, Del.*

September 12th, 1882, I was requested to see in consultation Mrs. Jane A., a widow, aged 77 years. She had been ill six weeks, with intense, agonizing pain, diagnosed as neuralgia, about the right side of her head and the right ear. She had experienced considerable dizziness, and roaring tinitus and had become very deaf.

Her right external auditory canal was closed with impacted masses of epithelium and swelling of its walls, due to acute desquamative inflammation. Removal of a portion of the epithelium and use of warm applications gave partial relief. Two days later a purulent discharge manifested itself and she was greatly relieved by the abating of the constant boring pain. Perforation of the "drum" membrane was found and inflammation of the mastoid soon after became manifest. Subsequently, about the middle of October, chronic meningitis was well marked. Her vision became very poor and ophthalmoscopic examination showed optic neuritis of both sides, most marked upon right side. She was slightly delirious and dangerously ill for four months, under the care of her family physician, Dr. C. W. Kirchner, with whom I consulted from time to time. Leeching of the mastoid gave only partial and temporary relief. (Fortunately her digestion was good

and she was made to partake freely of food and stimulants).

She did not experience decided and permanent relief until hypodermic injections of morphia and minute doses of calomel were used. Blistering of the mastoid was subsequently resorted to repeatedly, and was always beneficial. Her hearing was restored. She recovered from the meningitis and optic neuritis. Her mental faculties became clear and bright again. She has not had any pain about her mastoid region for three months or longer. She has regained flesh and is able to go out riding.

MASTOID DISEASE—ARTIFICIAL PERFORATION OF THE BONE—TEMPORARY RELIEF—DEATH FROM PYÆMIA.

By Charles H. Burnett, M. D., *Philadelphia, Pa.*

This paper contains an account of a case of chronic purulent inflammation of the middle ear, inducing general increased vascularity of the pyramidal part of the temporal bone, hyperostosis of the outer wall of the mastoid portion, and a thinning of the sigmoid groove, without necrosis. The mastoid cavity became filled with cheesy débris, and this furnishing a pyæmic source, embolism of a chronic form ensued, as shown first by the abscess in the lung and then by the pyæmic infiltration of the liver resulting in a vast number of abscesses. The operation, it will be seen, gave temporary relief to the acute aural and mastoid symptoms, but, of course, had no effect upon the pyæmic element in the case, because of the great chronicity in this latter respect. An early operation, perhaps years before, might have prevented the accumulation of cheesy masses in the mastoid antrum and the consequent occurrence of pyæmia.

History.—James B——; thirty years old; born in Ireland; a weaver, was admitted to the Presbyterian Hospital, Philadelphia, April 11, 1877. His aspect was phthisical, but he stated that his health had always been good until within ten weeks, when he was admitted to a hospital for "pleurisy." He remained there seven weeks, when he was dismissed cured, as he was told. Immediately following his sojourn in the aforesaid hospital his right ear

became painful and sore to the touch, the auricle stood out from the head, and the pain in and about the ear was so great as to deprive him of sleep. After enduring this suffering for two weeks he was admitted to the Presbyterian Hospital, where I examined him, and obtained the above history, on April 13, 1877. At this time his right auricle was standing far out from the head, the mastoid region was red, boggy, and tender on hard and deep pressure. His pain was chiefly and constantly in the mastoid; but at times there was a dart of pain into the right temple. An offensive, thin, transparent yellowish matter flowed copiously from the painful ear, and examination revealed a largely perforated membrana tympani and a macerated and tender auditory canal with granulations on the posterior wall at the opening of a sinus. The watch could be heard only in contact. The patient stated that this ear had been affected for many years with discharge, and that at times he had attacks of pain and soreness similar to this, but that no attack had been as severe as this last one. His pulse was 88; appetite good; secretions normal, no cerebral symptoms. Four leeches were now applied to the mastoid region and four or five ounces of blood were drawn. This gave but slight relief, and at bedtime, a few hours later, he was obliged to have one-eighth of a grain of morphia sulph. to get rest. He awoke from time to time with pain, but obtained some ease with two eighths of a grain more of morphia.

April 14th.—The next morning his face was flushed; pain in mastoid very severe; pulse, 86; temperature $98\frac{3}{5}$; tongue coated; headache and malaise great. Afternoon: pain increasing in the mastoid; latter very tender, especially at its tip; appetite fair; bowels open; no cerebral symptoms. At 4 p. m. the patient was etherized, and after making an incision in the soft parts one-fourth of an inch behind the auricle, I perforated the outer mastoid wall with

A. H. Buck's conical drill, three fourths of an inch above the tip of the process. The severed branch of the posterior auricular artery was ligated. No pus issued from the opening thus made in the bone, but the cellular structure of the mastoid was easily reached through this opening and the cells toward the antrum were broken by a probe, thus affording an exit for retained pus. The periosteum was dissected freely from the mastoid, but no disease of the outer table of the bone was found. A simple greased tent was now put into the wound thus made and the patient put to bed to await recovery from the ether-narcosis. Beef-tea and milk ordered, and morphia if pain continues.

April 15th.—Appetite good; pain generally less, though the neck was sore and stiff, probably from bruising at operation. Mastoid incision suppurating and mastoid tip tender. Some frontal headache, but the great pain in the temple and the mastoid had gone.

April 16th.—I ordered six grains quinine daily; tent removed and poultices placed over the mastoid opening. Pus issues from the artificial opening in the bone. Patient sits up in bed and looks and feels much better. Has had no cerebral symptoms.

April 17th.—Ligature from artery comes away; patient comfortable.

April 18th.—Some fever this morning, with photophobia and intolerance of all sounds. One-eighth of a grain of morphia at night.

April 19th.—Patient appearing weak and sleepless, gets a milk-punch every three hours, and quin. sulph., gr. ijss., every four hours, with morph. sulph., gr. $\frac{1}{8}$, two or three times in the night.

April 20th.—This morning has less fever and less pain; discharge free and purulent, from mastoid opening and from the meatus. Urine contains no albumen.

April 21st.—Less fever and no pain; discharge from wound diminishing.

April 22d-23d.—Appears to be getting well; wound in mastoid healing.

April 24th.—Ten days after operation is able to get up and dress himself and walk about the ward; stimulants stopped. In the evening began to complain of general malaise; his temperature rose and his pulse became more frequent; tongue dry.

April 25th.—Remains in bed; whiskey and quinine resumed, pulse full and bounding; temperature 104.6°; bowels confined; whiskey stopped and a fever mixture given; wakeful and nauseated all night.

April 26th.—Tongue dry and brownish; constant nausea and vomiting; *complains of pain in region of the liver.* Violent chill in afternoon. Is taking brandy and soda, and two and a half grains quinine every three hours.

April 27th.—Tongue is better, but still complains of nausea and pain in stomach and over the liver; fever continues. Discharge from the wound and ear less, very little pain and soreness in mastoid, wound nearly healed.

April 28th.—Bowels inclined to be relaxed through the night. Temperature, 104°; delirious during night.

April 29th.—Tongue dry and brown; pain and tenderness in hepatic region great. Hiccough, vomiting, and delirium. Pulse more rapid and weaker; respirations very rapid; coma. Death at 1.30 A. M., on April 30th.

Post-mortem examination fifteen hours after death.—The omentum in proper position, but darkened by venous congestion and at its upper and right hand side thickly studded with flakes of recent lymph. The stomach was marked externally by patches of lymph over the fundus and at its pyloric end was adherent to the under surface of the liver. The duodenum firmly adherent to contiguous viscera and so softened as to be torn in attempt-

ing to remove it. The liver was covered externally with peripheral abscesses, like yellow spots, varying from one-fourth of an inch to one inch in diameter. The spleen contained no abscesses. The liver was found filled with disseminated abscesses throughout its parenchyma. The left lung was normal, excepting the presence of small abscess on outer side of lower lobe, one-half inch in diameter, surrounded by hardened zone, the whole one to one and one-half inch in diameter. Brain: The cerebral surface of the temporal bone of the diseased side was slightly darker than its fellow, and the dura mater not so adherent as on the normal side. The tympanic cavity and mastoid cells were filled with a cheesy mass; the ossicles were present; membrana tympani largely destroyed. There was great hyperostosis of the outer table of the mastoid portion; it was half an inch thick at a point three-fourths of an inch behind the external auditory meatus. A fistulous opening was found in the upper back part of the wall of the external auditory canal, leading into mastoid antrum. There was no necrosis of any other part of the temporal bone; no sign of phlebitis, nor of thrombosis in the sinuses of the brain, nor in any of the veins leading from the tympanum. The cheesy mass in the mastoid cells was lying against the mastoid surface of the bony gutter in which runs the lateral sinus, but there was no necrotic spot in this bony channel. Numerous evidences of extensive chronic disease in the temporal bone were found, consisting in the great thickening of the outer wall of the mastoid, as stated already, and in a thinning of its inner wall where in contact with the sigmoid sinus. The nutrient vessels and the canals conveying them in this region of the temporal bone were much wider and larger than on the healthy side. It seems highly probable that the embolism occurred by the way of the lateral sinus in consequence of the morbid changes in that region, just narrated.

Conclusion.—1. This man died of pyæmia induced by long continued purulent disease in the middle ear and mastoid cavity. The embolic elements passed by the brain to lodge in the lung and liver, an unusual course in pyæmia from ear disease. 2. The operation of trephining or perforation of the outer mastoid table is strongly indicated in such cases. It has no effect whatever in hastening a fatal issue, even if it had no effect in preventing it, as shown in this case, as the man recovered from the operation to die of pyæmia. 3. When fistulous openings exist in the upper back part of the bony auditory canal, as in this case, it becomes worthy of our consideration whether we should not follow the indication of nature and make a larger opening at such a point, especially as we may in such cases suspect hyperostosis of the outer wall of the mastoid. 4. The safety of the operation on one side, and the great dangers of a concealed pyæmic nidus in the mastoid, in chronic purulent otitis media, on the other hand, should incline us to regard, in many cases, a prompt opening of the outer mastoid wall as the one great chance of saving the patient's life.

DISCUSSION.

Dr. McKay, of Wilmington, said that the discussion, as last year, had taken place before the paper.

Dr. Sexton, of New York, had found difficulty attending the removal of these desquamative masses, which have become partially impacted in certain cases and are likely to set up tinnitus aurium with other subjective symptoms that might lead to the supposition that the disease is much graver than it is; that sometimes it is impossible to get to one side of them; and that in the efforts at removal surgeons were very apt to wound the drum-head unless very great caution is exercised. He thought that quite often

the drum-head is wounded under these circumstances and that middle ear inflammation is brought about in that way. At least symptoms are not infrequently developed which are difficult to control, especially in old persons in whom denudation of the walls of the external auditory canal is of frequent occurrence, and very much complicated the case. The autophonous phenomena, where one very often met with in these cases, are often the cause of very much alarm to the patient, and may give rise to the belief that the brain is effected.

Dr. McKay said that in his original notes he used the words "with tenderness and care." He fully concurred with Dr. Sexton, and believed that if he had persisted in his efforts at removal he would have done harm.

Dr. Strawbridge, of Philadelphia, said that concerning trephining the mastoid he would like to ask for, and get if possible, some opinion of the Society as to the indications for the performance of the operation. He had never performed it at all upon the living subject. He had been looking his notes over and found that he had seen over 4000 cases of purulent middle ear disease within the last twelve years, and yet he had not trephined a single mastoid, nor had he had a death, except in one child six months old that died a few hours after he first saw the case. Several gentlemen had reported quite a number of cases, in which the operation seemed to be demanded, at least it was performed, and he had come to regard himself as almost unfortunate that he had not seen similar cases. In studying the matter, however, he had been struck with the small percentage of cases in which pus was found at the time the operation was performed. He did not recollect the exact figures, but the percentage was excessively small. He recollected asking one gentleman whether he would regard it as good practice to trephine the bone and not find any pus, and his reply was, that he saw no particular objection, that the

operation was one which did no harm, and that some form of counter-irritation was proper at any time. In all earnestness, however, he would ask whether, when pus is not found it would not be evidence that the operation had not been indicated.

Dr. Knapp, of New York, said there were quite a number of cases on record where trephining was of material benefit, without pus being found. In one case in which he had trephined the mastoid, already published in the Archives, the bone was sclerosed and he opened the lateral sinus, but the patient recovered, and since that time has been completely free from the pain which had lasted *two* years before the operation and had had no further trouble of any kind. These cases are not at all isolated. Hartmann relates similar cases and Dr. Buck recommends the operation for just such cases. His firm conviction was that when chronic middle ear disease, even without perforation or suppuration, leads to more or less constant pain, which has its origin in the mastoid process and radiates from there over the corresponding half of the face and head and is persistent, the operation is indicated. It is a chronic inflammation, gradually the partitions between the mastoid cells become thickened, this process goes on, and in the course of a year the mastoid will be a compact bone. But until that process is finished years may elapse, and an important part of life which may tell on the future, may thus be spent in suffering and with inability to do any kind of work.

With reference to indications, however, he had seen three cases in which death occurred, and in which he held that opening the mastoid would have averted a fatal issue. He wished to make this statement plainly. The first, was a case which he had already published in a late number of the Archives. That patient had acute otitis media from sea-bathing, and the principal symptom was headache

passing from the ear partially to the occiput and partially to the forehead, which never left him. There was no external evidence of mastoid trouble whatever; no swelling, nothing at all. Six weeks or two months later he had a fistula in the occipital bone and an immense quantity of pus was evacuated, and through the fistula a probe could be passed into the cranial cavity. A considerable quantity of pus was discharged daily, which Dr. Knapp thought came from the mastoid process. On the fifth or sixth month of the disease there was a marked degree of neuro-retinitis. Post-mortem showed that the disease originated in the mastoid process and that the inner table of the skull was completely corroded; the bone had been destroyed by the disease. It was as clear evidence as possible that if the patient's mastoid had been opened in the second or third month, while complaining of such intense headache, his life would have been saved, since the inner table was completely gone and there was no change in the meninges. The lateral sinus was completely free. There was only a fistula in the bone, a corresponding cerebellar abscess, which evidently occurred later.

Obstinate, more or less constant headache radiating from the mastoid process on the corresponding side, he thought gave a distinct indication for opening the mastoid and the discharge may be more or may be less. If this symptom is strengthened by others, no time should be lost by delaying the operation. External mastoiditis, which is mostly propagated from periostitis of the canal, and which shows its distinguishing feature in filling up the mastoid angle, is a disease which is commonly very easily cured. If there is pus, make an incision, and this may be sufficient to effect a complete cure within three or four days. Of such cases he had already placed several upon record. But there is another class of cases, of which he had seen several. Sometimes the symptoms of suppuration are so

nearly given that it seems almost evident an opening will soon be necessary. There is pain, swelling, the angle is completely gone, etc., but, unless there is distinct fluctuation it is not necessary to open in these cases. He had seen such cases, in which he had expected to be obliged to make an opening, but in which he had applied simply some ointment and after the swelling had lasted a week or so it had disappeared entirely. He did not think it was exactly necessary, where the mastoid is puffy, to make a Wilde's incision. It is better to wait for a few days, and more frequently than is generally supposed all the symptoms will subside, and the appearance as though an operation might become necessary pass away.

Dr. Sexton, of New York, said he had often wondered why he had not had something of the experience related by Dr. Buck, Dr. Knapp, Schwartze and others in seeing those cases requiring operation upon the mastoid. He had seen a large number of cases of aural disease during the last fifteen years, but only a very few where he thought it necessary to make a perforation without some evidence aside from pain existing in the mastoid. He thought the pain in the majority of cases is not confined to the mastoid. The tympanic cavity had, in his experience, been the seat of the pain more frequently than any nervous distribution in the mastoid cells. He thought there was where a mistake, if mistake there be, was made in attributing such importance to the symptom of pain with reference to operating in these cases. With regard to operative procedures, the point occurred to him that there is opportunity sometimes afforded for liberating the collection of matter through the posterior wall of the canal. He thought that, in a large number of cases, the opening takes place in that direction rather than through the cortex of the bone. He had been in the habit for some years of enlarging these openings and early removing the bone, as soon

as sequestra have formed, or where they have been partially detached. With regard to the general question, he thought treatment in the earliest stage of the greatest importance, and where so treated by constitutional measures we frequently arrest the more severe symptoms of inflammation of the mastoid cells. He would repeat again that he was more and more convinced of the beneficial effects of sulphide of calcium, and of the important control which it exercises over inflammatory processes. He thought that, perhaps, the experience of some had been unfortunate in the use of this remedy because of the size of the doses employed. Certainly it will increase the secretion and formation of pus, and it should not, therefore, be given with the freedom very frequently practised. Very much smaller doses are efficacious than we are inclined to use. In his own experience he had used smaller and smaller doses every year, and it is very seldom now that he gives more than $\frac{1}{10}$ of a grain. In many cases he gave smaller doses than that, perhaps repeating it every one or two hours. Since using this remedy he had seen much less of symptoms of inflammation of the cells of the mastoid, external periostitis, and had much less occasion to perforate the drum-head in acute inflammation of the middle ear. The use of leeches, of course, is not indicated where such results are expected from the use of the sulphide of calcium. Of course the liberation of pus when formed is a well-established surgical procedure which is not to be ignored.

Dr. Theobald, of Baltimore, was much interested in Dr. Strawbridge's statement that he had seen some thousands of cases without having encountered any that presented the necessity for opening the mastoid process. His own experience accorded with Dr. Strawbridge's, although he had seen a smaller number of cases. So far, his opening of the mastoid process had been confined to

the dead subject. He had seen several cases of acute inflammation of the mastoid process following inflammation of the middle ear, but he had not seen a fatal case. By active constitutional treatment, he had seen symptoms disappear and the patients recover. He was very much inclined to think, from his own limited observation and from a study of published reports, that certainly a large portion of cases in which the mastoid process had been opened, could have been cured by appropriate constitutional and local treatment. He regarded leeches as very serviceable indeed, and was inclined to take very much the same view as that taken by Dr. Strawbridge. Dr. Knapp had given us one class of cases in which early opening of the mastoid is indicated, but that the operation is indicated very extensively Dr. Theobald did not believe.

Dr. Kipp, of Newark, N. J., said he did not like to have the statements made concerning the infrequency of the occurrence of mastoid disease, go on record without some counter-statement. With regard to the indications for perforation he had had quite a number of fatal cases of otitis media, and post-mortem had shown that the mastoid cells were filled with pus and that it had given rise to cerebral abscess. These patients died without an operation. He had no doubt that in cases like that related by Dr. Knapp life might have been saved by a timely opening of the mastoid. The question with him was how to diagnosticate pus in the mastoid from external periostitis. He would rather operate and not find pus than to allow the case to go on and the patient die with pus in the mastoid cells, that could have been removed readily by an operation. He did not think the operation did harm. With regard to Dr. Sexton's views concerning the early constitutional treatment, there is no doubt that with acute otitis media there are but few cases in which mastoid disease develops, and that without respect to treatment, except perhaps in those

cases following scarlet-fever, and diphtheria of a malignant kind. He had recently had a physician under treatment for otitis media and in that case the condition described by Dr. Knapp occurred, but the patient recovered apparently entirely. But four weeks after the discharge ceased, external otitis developed, there was a slight swelling of the posterior wall of the external canal and within a few days pus formed immediately behind the auricle, not as in the usual mastoid abscesses, and then too a mere incision gave exit to the pus and the patient recovered. There are cases in which perforation will take place in the external canal. These cases occur without any disease of the mastoid cells at all. If periostitis follows mastoid disease, matter will point outward, while in the cases of primary periostitis the matter will be discharged through the wall of the external canal and an incision through the integument of the process can not prevent it.

Dr. C. H. Burnett admitted that we are not positive with regard to indications for opening the mastoid; that is, the rules can not be laid down with mathematical accuracy, nor could such rules be applied to the majority of operations on the human body. He did think, however, that in many cases we are justified in operating, rather than in refraining from operative interference. He looked upon an operation on an intact cortical surface of the mastoid very much as operating upon an intact drum-head. He did not propose to cut into it unless he wished to allow something to escape. He did operate on the intact mastoid surface simply to relieve pain, and never upon the outer surface unless the membrana tympani was already perforated either by art or by nature. The operation itself, he thought, was almost harmless, and it is just because we are uncertain as to what is behind the drum-head in cases of disease of the middle ear that puncture is justifiable and the same is true with reference to opening the mastoid.

Suppose we do perform the operation without close indication that there is anything behind the mastoid wall, but we have reason to suspect that there is something behind it, it is no argument against the operation if nothing is removed. He was not anxious to operate on any man's mastoid, but he thought we had better err on the side of the operation, in chronic ear disease, than upon the side of refraining from performing it. He thought that, if his patient had been operated on a year previously, he would not have died of pyæmia; perhaps the necrosis of the sigmoid groove would have occurred and perhaps he would have died of that. He had seen a case of death from mastoid disease where he was not allowed to operate, and strange to say it was an acute case. He had seen many cases of mastoid disease in all, and two fatal cases, both acute, one in a man, the other in a woman, but the man would have lived if he had been operated upon.

Relief in painful cases may be given by incising the integument, and this is safe to do before operating upon the bone. He did not think we were likely to make a mistake upon the side of the operation.

Dr. E. W. Bartlett, of Milwaukee, had seen several of these cases, in the lake region, where he resided, and it had been his misfortune to lose some of the patients, the attack often being so sudden and severe that nothing could be done. It had struck him that there was something besides otitis media and mastoiditis to be considered in these cases, a much more serious affair, and that is pyæmia. The patient has chills at irregular and different intervals of time, not following the order of malaria, perhaps has a colliquative diarrhœa, etc., and then, on inquiring whether they have ever had ear disease he frequently finds that they have had, and also finds an offensive discharge coming from the ear. These are symptoms sufficiently diagnostic of pus in the mastoid cells. But he had not

perforated the mastoid by trephining. He had not found it necessary. The symptoms are usually so severe, that any operation by which much blood is drawn, such as the use of leeches or the operation of trephining, is apt to depress the patient too much. The remedy which he had relied upon is the poultice, changed every half hour, and applied as hot and moist as the patient can possibly bear. He had seen several cases in which pointing had occurred within twelve hours after the poulticing was begun, and as soon as pointing occurs, it is easy to make an incision through into the mastoid with an ordinary stout scalpel. In the meantime he gave the patient as much quinine as he would bear. With regard to the sulphide of calcium, he thought it was contra-indicated in these cases as it increased suppuration. The object was not to increase, but simply to produce suppuration as rapidly as possible in the mastoid, so that the pus can be removed and thus prevent the patient from dying of pyæmia. If he should ever have a case in which the symptoms were urgent and poultices did not cause the mastoid to suppurate, he would not hesitate to trephine.

Dr. Knapp, of New York, would not think of opening the mastoid for the relief of pain simply. He only mentioned pain as one of the leading symptoms. Neuralgia is not constant, but the pain which starts from the ear and radiates backwards and forwards and towards the apex is an important symptom. There is no ear disease without pain, and it was the peculiar distribution and character of the pain to which he alluded.

Dr. Strawbridge, of Philadelphia, said concerning poultices that his experience was entirely in accord with Dr. Bartlett's. He began poulticing early, maintained it continuously, changing them every two hours at least, day and night, and had seen many cases in which the drumhead has entirely healed, the discharge entirely ceased, and then he stopped poulticing.

Dr. Burnett asked, What effect does poulticing produce on the mastoid cavity? For a superficial swelling probably all of us poultice, but what effect does a poultice produce on the mastoid cavity? If poulticing the surface of the mastoid brings about resolution of inflammation of the mastoid cavity, well and good. In some cases certainly it does not.

Dr. Strawbridge said he was sure that poulticing brings an end to suppuration, and it must be by establishing resolution through stimulation. The suppuration undoubtedly comes to an end, as the discharge stops and healing goes on. With regard to what change is produced on the bone, it must follow the same rule as in the soft tissues.

Dr. Burnett thought they were talking about different things. He did not refer to the cases in which suppuration is visible, and if the gentleman meant discharge from behind the ear there is certainly an opening in the integument. Dr. Strawbridge must apply poultices to either increase the discharge or to cause resolution, and says suppuration ceases and resolution is established. If we have swelling, is that due to disease of the mastoid integument or the periosteum? Poulticing may relieve it if it be in the periosteum, and the question is, after the swelling has subsided, what was the condition in the mastoid cells? He did not think that poulticing has much effect upon the mastoid cells, if there is an intact external wall.

Dr. S. J. Jones, of Chicago, said that one of our troubles arises from want of definite understanding as to what we have to deal with. We have acute suppurative inflammation; we have chronic suppurative inflammation; we have chronic suppurative inflammation which lights up into acute inflammation, and we have also periostitis, which may be primary or secondary. It is important that we should distinguish in each case with regard to

treatment, and therefore no general rule can be drawn, and each case must be determined by itself. We may have chronic inflammation accompanied by pain, in which perforation of the mastoid cells may be resorted to with advantage. There are also cases of chronic inflammation which can be treated with advantage by the use of persistent counter-irritation with blisters, perhaps aided by the local abstraction of blood by means of leeches. In cases of a lower grade of inflammation he had found marked advantage in the employment of counter-irritation. He had had but few cases in which he had been called upon to perforate the mastoid cells. Fortunately he had not found one, in which the operation was performed, where he did not find pus at the time of its performance. Frequently, also, a free incision over the mastoid process, perhaps supplemented by leeches, will enable us to feel our way with regard to subsequent perforation of the mastoid cells. Before formulating our ideas we should see more clearly the pathological condition with which we have to deal.

Dr. E. E. Holt, of Portland, Me., said his experience was rather limited with reference to this class of cases. He had had about 40 cases of mastoid disease, but he had not perforated the bone, although he had had his instruments ready several times. He had not had a death when he thought it could have been due to the fact that no operation was performed. He had had three deaths in his forty cases, forty cases out of about 2,000 cases of ear disease. He had used leeches more than any other measure, except perhaps, incision.

The President said he supposed the percentage of cases seen by different men, like the percentage in other cases varied. One man will see more than another; as for example he had not seen so many cases as Dr. Holt's statistics indicated, and he supposed that the statistics of each surgeon would vary.

Dr. Sexton wished to correct an impression which Dr. Kipp seemed to have; that is, that he, (Dr. S.,) alluded to the fact that it is rare to have mastoid disease in acute inflammation of the middle ear. Dr. Sexton did not wish to be understood as making any such statement in speaking of the sulphate of calcium. He wished to state that in nearly all severe cases of middle ear inflammation there is more or less inflammation of the mastoid cells, that would be the beginning of what is called mastoiditis and in these cases it is that the remedy is particularly indicated.

Dr. Burnett said that so far as he was concerned he was generally against the mastoid operation. He wished to give the other side full justice. But if we take Schwartzes' cases it could be seen that he distinctly says that after leeching, perhaps Wilde's incision and other measures have been adopted, and there is no relief to the pain, he operates, and certainly seventy per cent. recover and not more than ten per cent. die. That shows that the operation is not a very dangerous one, and Dr. Burnett thought we should not throw up our arms and hands against it.

Dr. Knapp said he had been averse to opening the mastoid, but there are certain indications which are plain and when they are present and trephining is not done, we are guilty of the sin of omission. In acute cases, if rest, leeches, steaming, poultices, do not bring about a discharge which has been stopped, in a patient who has been the subject of discharge, and there are perhaps general symptoms, as fever, chills, if there is tenderness on pressure upon the mastoid, the mastoid should be opened. He had done so in several cases, with benefit. In chronic cases it is more or less the same thing. If treatment does not relieve, if discharge cannot be provoked, if the mastoid region be swollen, etc., we have to open the mastoid; perhaps only to enlarge fistulæ which remain, go in and free the cavity of any cheesy material or offensive masses

of necrosed bone. There are certain indications which are as plain as are the indications in glaucoma, and he congratulated the gentlemen who had seen so many thousands of cases of ear disease, and yet had not met with such. But as regards the indications as stated in the books, while they are quite precise, there are a number of cases in which they are not so precise, and it is in these cases that we have to examine more carefullly.

Evening Session.

The discussion was continued at the evening session.

Dr. Sexton, of New York, exhibited a patient, now a waiter at the hotel, who was under his care in the N. Y. Ear Infirmary formerly for chronic inflammation of the mastoid cells of the left ear without perforation of the membrana tympani. There may have been perforation at some time previously, but there was no history of discharge from the external auditory canal. There was extensive swelling behind the ear, and there was a sinus extending from without, into the mastoid antrum and the cells. The ear trouble was complicated with ozena. The treatment consisted in keeping the opening free and in the administration of calcium sulphide.

Dr. Gruening, of New York, asked, Why keep the opening free? Here nature opens the mastoid, which Dr. Sexton would never have done, and then Dr. Sexton tries to keep the fistula open.

Dr. Kipp, of Newark, referred to a case where there was an abscess of the mastoid which he opened. There was no perforation of the drum head, but the membrana tympani was opaque. He believed that disease of the mastoid might occur without necessarily having perforation of the drum head.

Dr. Sexton would state in reply to Dr. Gruening's

remark, that there was a good deal of connective tissue increase, and that there was considerable amount of purulent discharge which made it desirable to keep the cutaneous opening free, and there was not a large discharge from the mastoid cells, although the patient was kept under observation for one or two years. In this case the calcium sulphide was given at intervals of one, two, or three months, for one or two years, and with what he regarded as very good results, although the patient was not seen continuously and his habits were not regular. There was no indication of the presence of middle ear disease after Dr. Sexton saw the patient. It might be remarked that Ringer recommends the use of calcium sulphide in old chronic cases of bone disease, especially where there is a scrofulous tendency, which possibly existed in the patient presented.

Dr. Gruening said that he did not think that Dr. Sexton answered his question. Nature opens the bone and the man gets well, not from sulphide of calcium, but because the pus is discharged, and the question is, why not open the process when we are convinced that there are polypi, or granulations, or cheesy pus there which should be removed. Sometimes nature opens the mastoid process on the inside, and the patient dies of meningitis.

Dr. Sexton said that so long as there existed active caries and a discharge from the mastoid cells he would be careful to maintain free exit for the matter. In his case whatever of bone came away was in a broken down condition, and no large sequestrum was detached. He did not know what he would have done had he seen the patient earlier, but in the cases which he had seen earlier he had not found it necessary to open the mastoid process, and he thought the operation was often unnecessarily performed.

Dr. Gruening said the last remark was just what he had been waiting for. He believed that the operation is not unnecessarily performed. He thought that we merely

discarded general surgical principles and acted unscientifically when we declined to open the mastoid process which contained pus, or other material which could not escape through the opening in the drum head. Surgery has established now that, wherever there is a focus of purulent discharge it should be removed. This can be removed with safety, and if we do not do it, we know nothing of surgery. It is a life saving operation, and should be done under all circumstances.

THE SECRETARY then read a letter which he had received from Dr. Buck, of New York, in which mention was made of a case in which he had just perforated the mastoid with great benefit.

DR. THEOBALD said he thought the Society had not committed itself not to opening the mastoid, but he believed that it was the general opinion that under certain circumstances the operation should be performed, although it might be that in the larger number of cases it was not required; and also there had been some doubts expressed with regard to the propriety of the operation based on the fact of the infrequency of the existence of pus at the time the operation was performed.

DR. KIPP thought pus was not found so infrequently as had been supposed.

DR. GRUENING said all he insisted upon was the necessity for the operation. He further remarked that Schwartze had divided his cases into two classes. First: Where it is not expected to find pus, and in those cases he wished simply to establish free drainage whenever middle ear trouble is so intense that he cannot master the situation by merely treating the ear itself, and had given a number of such cases in which this plan of procedure was adopted where he had not found pus. The other class of cases does not admit of any discussion at all.

DR. BURNETT thought if Dr. Theobald meant that pus

does not come out immediately through the soft tissues, that when these cases were further looked up, it would be found that pus had come from the mastoid subsequently if they get well, and if they die that cheesy matter would be found to exist in the mastoid cells. A man may be in danger without fluid pus in the mastoid antrum. The existence of cheesy matter is more dangerous to him than fluid pus. Even if we are sure that fluid pus is not in the mastoid antrum, but are sure that cheesy matter is there, we are in duty bound to open the bone and remove it. If delayed it may be too late, and chronic pyæmia may become established and no operation will then save the patient's life.

Dr. Sexton asked if Dr. Burnett expected to find any considerable cheesy accumulation in acute cases.

Dr. Burnett replied that he did not.

Dr. Sexton said these are the cases to which Dr. Theobald alludes in which pus is not found.

Dr. Burnett said that even there serious inflammation might be present without cheesy matter, or even without pus, and he believed that there were more data in favor of the operation than against it under those circumstances.

Dr. Theobald said we have a chronic middle ear trouble with acute inflammation of the mastoid process supervening. The point which he wished to make was that we have such chronic cases, suppurative cases of the middle ear with perforation of the membrana tympani; presently the bone becomes diseased and we have swelling in the mastoid region, and tenderness, puffiness, possibly some evidence of commencing meningeal trouble. He thought that in many of these cases the practice is to go on and trephine the mastoid process, and he believed that in the very large majority of such cases pus is not found in the mastoid cells. These are the very cases in which active anti-phlogistic treatment, especially by the use of leeches and the admin-

istration of calomel to impress the system with the specific effect of the mercury will cut the affection short. The operation only complicates matters, and brings about suppuration which could have been avoided by constitutional measures. He again said he believed that in the large majority of cases pus is not found, but merely an acute congestion or a slight periosteal inflammation of the cells which can be cut short by the abstraction of blood and the administration of mercurials.

Dr. Gruening, of New York, said he did not wish particularly to mention the number of cases which he had had, but he had performed the operation at least sixty times, and thought that in thirty cases at least it was for acute disease. In twenty-eight he found pus. In two cases he did not find pus at the time of the operation, but on the following day profuse suppuration existed, and the patient was immediately relieved.

Dr. Webster asked if he would perform the operation where there was already evidence of brain disease, such as paralysis of one of the recti muscles, etc.

Dr. Gruening said he had done that, but he could not give a favorable prognosis.

Dr. Bartlett asked Dr. Gruening if he had thoroughly poulticed the mastoid in the cases in which he had operated.

Dr. Gruening said he did not remember particularly. He had used warm applications.

VERBAL COMMUNICATIONS.

EXHIBITION OF PHOTOGRAPHS.

Dr. S. Sexton, of New York, exhibited the following photographic illustrations of cases in aural practice :—

I. Facial Paralysis in a child seven years old, consequent on otitis media purulenta involving the mastoid cells and aqueductus Fallopiæ of the left side.

II. A case of Hæmatoma auris from trauma in a man about forty years of age.

III. A case of Hæmatoma auris from trauma in a woman about thirty years of age.

IV. A case of Hæmatoma auris from trauma in a man about twenty-five years of age.

V. A case of Obliteration of the mastoid cells from scarlet fever in childhood, leaving a large cavity lined with whitish membrane; communicating with tympanum, and with a large opening outwardly through the cortex. Patient's age 19.

VI. A case of Suppurative Otitis, involving the squamous and mastoid portions of the temporal bone in a child ten years of age.

VII. A case illustrative of Adhesive Inflammation of

the integument of the external auditory canal; with occlusion.

VIII. A case of Sloughing of both lobules in a child about seven years old, from wearing earrings of 8 karat gold and weighing 10 grains.

IX. Case of Fibrous Tumor of lobule from piercing in a girl about eighteen years.

X. Case of Steatomatous Tumor of lobule in a male aged twenty-three years.

XI. Case of Osteoma of the mastoid process.

XII. Case of Vascular Tumor of the dura mater involving the entire petrous bone.

XIII. Case of Malformation of both auricles; Polyotia on one side.

XIV. Case of Protruding Polypus and Steatomatous Tumor of lobule on same side.

DISCUSSION.

Dr. Knapp said that he had seen one case of osteoma of the mastoid process and that was in Billroth's clinic, where it was removed without difficulty, and the wound healed smoothly. There was no other complication.

Dr. Sexton said that in his case there was acute purulent inflammation some time ago.

EXHIBITION OF INSTRUMENTS.

The following new aural instruments were exhibited by Dr. S. Sexton, of New York :—

Fig. 1. Combined Hook and Curette. This instrument has been devised for the removal of foreign bodies from the ear; the curette is of medium size, as shown in the cut. The elongated and bent curette, with

Fig. 1. Combined Hook and Curette.

which one end of the instrument is armed, constitutes a hook for the removal of foreign bodies which are difficult of dislodgement; the concave surface is roughened, the better to prevent the instrument from slipping when in use.

Fig. 2. Brass Syringe. This syringe may be employed for gentle syringing, but is not suited for the removal of foreign bodies or inspissated cerumen: it may may be placed in the hands of patients or nurses who are

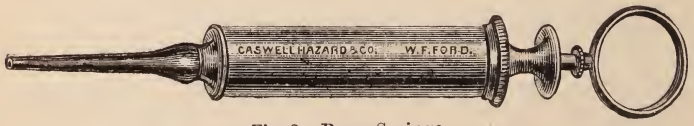

Fig. 2. Brass Syringe.

competent to employ an instrument of the kind—it is

much more efficacious than the ordinary hard rubber syringe. The unevenness of the vulcanized surface of the calibre of the latter causes much friction to the packing and is an objection to their employment.

FIG. 3. SOFT RUBBER AURAL SYRINGE. This instrument may be very safely placed in the hands of patients where it is advisable to allow them to employ a syringe themselves. It is of Dutch manufacture and seems to be not liable to get out of order. It may be obtained of Messrs. Ford, Caswell, Hazard & Co., New York, who are the manufacturers of the two instruments first described above.

Fig. 3. Soft Rubber Aural Syringe.

DISCUSSION.

DR. PROUT took exceptions to the hard syringe if it was proposed to put it into the hands of the patient to use. The soft one might do very well. The best syringe which he had used, and it was the only one which should be recommended to be used by patients, is the ordinary Davidson syringe, and this he desired to emphasize particularly.

DR. WEBSTER thought the soft syringe might answer for cleansing the ear of pus, but that it was inadequate for removing impacted cerumen.

EXPLANATION OF THE DIAGRAMS

ACCOMPANYING THE PAPER BY DR. E. E. HOLT ON "A CASE OF TERATOID TUMOR OF BOTH AURICLES." See page 87.

[The drawings were made after the completion of the text; the opportunity for further research has naturally been improved.]

Fig. 1. View of the tumor, about the actual size (from memory.)

Fig. 2. Median, longitudinal, vertical section of the tumor, amplified some three diameters, and of course largely diagrammatic:

A. Mature fibrous tissue, consisting of the ordinary felt-work of small bundles of fibres. B. Large fibrous trabeculæ, containing in their interstices much germinal matter, young connective tissue, &c., &c. C. Dermal structures of the variety shown in fig. 5. D. The same, showing horizontal sections of the papillæ. E. Dermal structures, variety shown in fig. 6. F. Large plate of reticular cartilage. G. Pure elastic tissue, equivalent to ordinary normal yellow elastic tissue. H. Adipose tissue. K. Area of germinal matter consisting of densely crowded embryonal elements lying in a basis-substance made up of myxomatous and elastic tissues, from this area are seen arising islets of cartilage, rudimentary vessels, hair-follicles, &c., &c. L. Peculiar ephithelial formation in cortical portion. (Fig. 3.) M. A very large aborted blood-vessel. (Fig. 4.) N. Deep-seated hair follicles. P. Marks the attachment of a process of the pedicle.

Fig. 1.

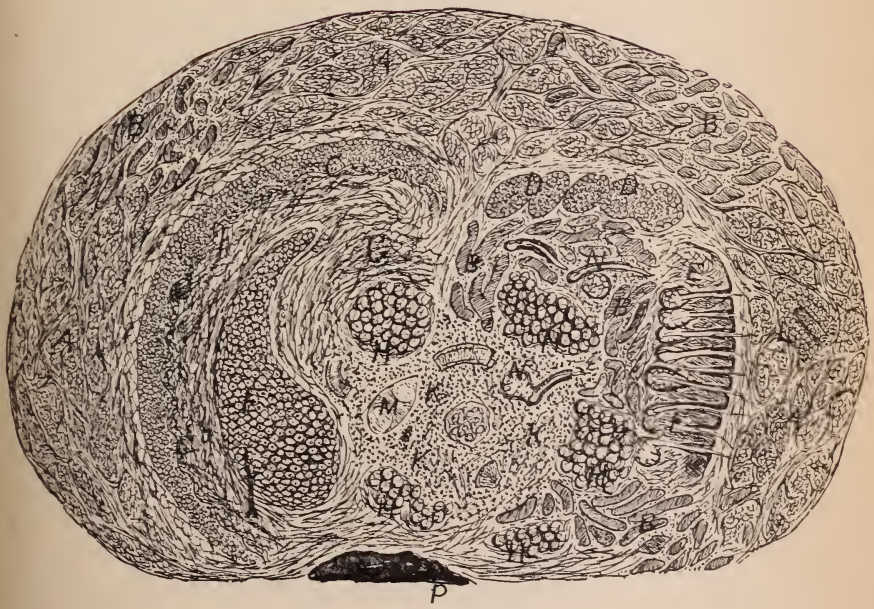

Fig. 2.

Fig. 3. The inner portion consists of cuboidal ephithelia. The outer layers are distinctly squamous. No line of demarcation was observed to exist between the two. Possibly an aborted epidermal formation. (× 350.)

Fig. 4. These vessels are composed wholly of smooth muscle and elastic tissues. No adventitia, nor endothelial lining visible. In no instance did any of these structures appear to inosculate. At low power (200) the structures in this drawing appear in a single field of the microscope. (× 350.)

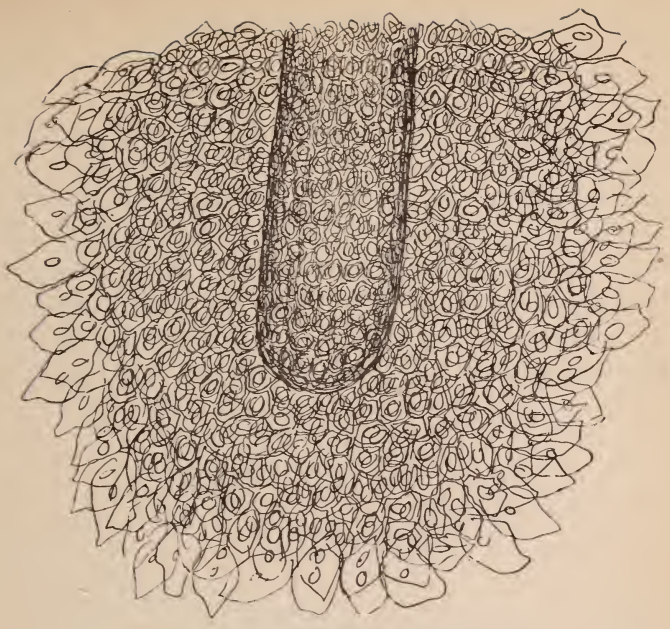

Fig. 3.

Fig. 4.

Fig. 5. Dermal structures. In this variety the epithelia of the horny layer are very rudimentary, nuclei mostly absent and hairs naturally not found. Said epithelia are not arranged in strata. The mucous layer shades almost imperceptibly into the corium. Both are rich in embryonal tissue and the latter in elastic fibres. (× 350.)

Fig. 6. Dermal structures consisting almost wholly of hair-follicles and sebaceous glands. Many of these follicles contain three rudimentary hairs each.

[Fig. 7 is omitted, for having recognized the infinitely chaotic character of the tumor, we have concluded that the deep follicles, which were apparently remote from any of their fellows and from dermal structures in general, were oblique sections of very long, curved follicles in communication with an unseen cutis.]

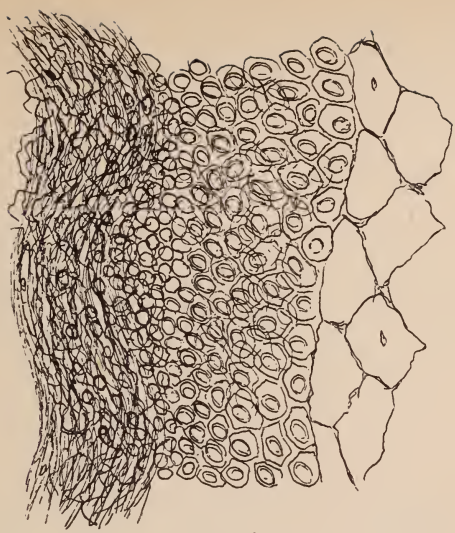

Fig. 5.

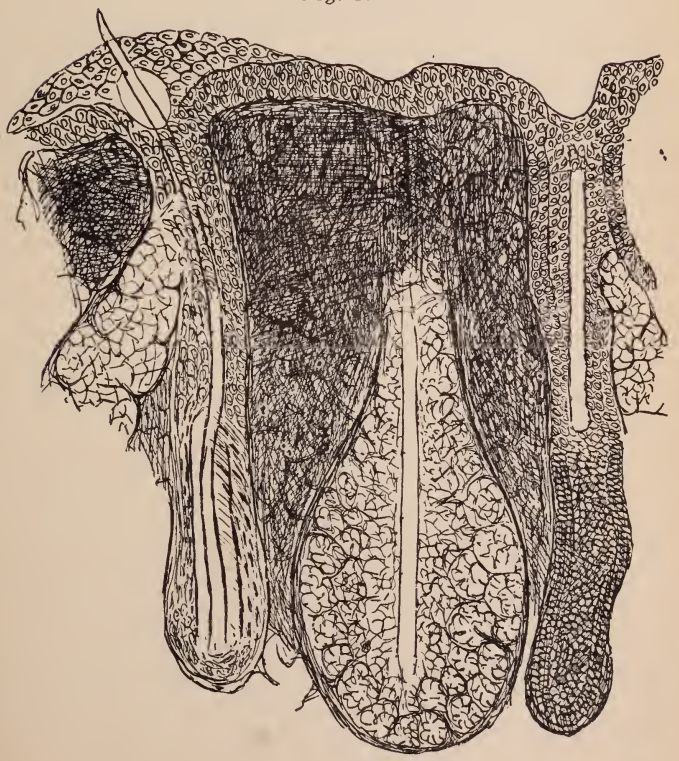

Fig. 6.

NOTICE.

The paper by Dr. J. A. Andrews, of Stapleton, St. Isl., N. Y., "On the Intermittent Perception of Sound as conveyed through the Air and the Cranial Bones, with a brief summary of the results of treatment in Chronic Aural Affections with Impaired Hearing," read by title at the Annual Meeting, and referred to the Committee on Publications, was lost in the mail.

J. J. B. V.

TRANSACTIONS

OF THE

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Dr. Cornelius R. Agnew,	New York, N. Y.
Dr. A. Alt,	St. Louis, Mo.
Dr. J. A. Andrews,	New York, N. Y.
Dr. S. C. Ayres,	Cincinnati, O.
Dr. Gorham Bacon,	New York, N. Y.
Dr. Edwin W. Bartlett,	Milwaukee, Wis.
Dr. Clarence J. Blake,	Boston, Mass.
Dr. R. O. Born,	New York, N. Y.
Dr. R. C. Brandeis,	New York, N. Y.
Dr. Albert H. Buck,	New York, N. Y.
Dr. Charles H. Burnett,	Philadelphia, Pa.
Dr. W. H. Carmalt,	New Haven, Conn.
Dr. John H. Dix,	Boston, Mass.
Dr. Ezra Dyer,	Newport, R. I.
Dr. Edward T. Ely,	Colorado Springs, Col.
Dr. B. E. Fryer, U. S. A.,	Kansas City, Mo.
Dr. John Green,	St. Louis, Mo.
Dr. J. Orne Green,	Boston, Mass.
Dr. Emil Gruening,	New York, N. Y.
Dr. George C. Harlan,	Philadelphia, Pa.
Dr. Edward L. Holmes,	Chicago, Ill.
Dr. E. E. Holt,	Portland, Me.

Dr. Lucien Howe, ... Buffalo, N. Y.
Dr. Samuel J. Jones, ... Chicago, Ill.
Dr. Charles J. Kipp, ... Newark, N. J.
Dr. Herman Knapp, ... New York, N. Y.
Dr. J. A. Lippincott, ... Pittsburgh, Pa.,
Dr. W. S. Little, ... Philadelphia, Pa.
Dr. F. B. Loring, ... Washington, D. C.
Dr. Arthur Mathewson, ... Brooklyn, N. Y.
Dr. Read J. McKay, ... Wilmington, Del.
Dr. C. S. Merrill, ... Albany, N. Y.
Dr. H. G. Miller, ... Providence, R. I.
Dr. Henry D. Noyes, ... New York, N. Y.
Dr. J. F. Noyes, ... Detroit, Mich.
Dr. Oren D. Pomeroy, ... New York, N. Y.
Dr. Thomas R. Pooley, ... New York, N. Y.
Dr. J. S. Prout, ... Brooklyn, N. Y.
Dr. William Rankin, ... Newark, N. J.
Dr. R. A. Reeve, ... Toronto, Canada.
Dr. S. O. Richey, ... Washington, D. C.
Dr. Charles E. Rider, ... Rochester, N. Y.
Dr. D. B. St. John Roosa, ... New York, N. Y.
Dr. John D. Rushmore, ... Brooklyn, N. Y.
Dr. William W. Seely, ... Cincinnati, O.
Dr. Samuel Sexton, ... New York, N. Y.
Dr. Henry L. Shaw, ... Boston, Mass.
Dr. Nelson B. Sizer, ... Brooklyn, N. Y.
Dr. E. D. Spear, Jr., ... Boston, Mass.
Dr. H. N. Spencer, ... St. Louis, Mo.
Dr. George T. Stevens, ... New York, N. Y.
Dr. S. B. St. John, ... Hartford, Conn.
Dr. George Strawbridge, ... Philadelphia, Pa.
Dr. Samuel Theobald, ... Baltimore, Md.
Dr. William Thomson, ... Philadelphia, Pa.
Dr. Charles A. Todd, ... St. Louis, Mo.
Dr. J. Van Duyn, ... Syracuse, N. Y.
Dr. J. J. B. Vermyne, ... New Bedford, Mass.
Dr. David Webster, ... New York, N. Y.
Dr. E. Williams, ... Cincinnati, O.

American Otological Society.

The Seventeenth Annual Meeting of the American Otological Society was held at the New Grand Hotel, Catskill Mountains, N. Y., on Tuesday, July 15th, 1884. The Society was called to order at 10.30 A. M., by the Vice-President, Dr. J. S. Prout, of Brooklyn, N. Y.

The following members were present:—

Drs.	F. W. Abbott	Buffalo, N. Y.
	A. Alt	St. Louis, Mo.
	J. A. Andrews	New York, N. Y.
	E. W. Bartlett,	Milwaukee, Wis.
	A. H. Buck	New York, N. Y.
	B. E. Fryer, U. S. A.	Kansas City, Mo.
	John Green	St. Louis. Mo.
	George C. Harlan	Philadelphia, Pa.
	Lucien Howe	Buffalo, N. Y.
	S. J. Jones	Chicago, Ill.
	Ch. J. Kipp	Newark, N. J.
	H. Knapp	New York, N. Y.
	J. A. Lippincott	Pittsburgh, Pa.
	W. S. Little	Philadelphia, Pa.
	F. B. Loring	Washington, D. C.
	A. Mathewson	Brooklyn, N. Y.
	H. G. Miller	Providence, R. I.
	Thos. R. Pooley	New York, N. Y.
	J. S. Prout	Brooklyn, N. Y.

W. W. Seely . . . . . Cincinnati, O.
S. Sexton . . . . . New York, N. Y.
S. Theobald . . . . . Baltimore, Md.
J. J. B. Vermyne . . . . . New Bedford, Mass.

And by invitation :—

Drs. Thomas Andrews . . . . . Philadelphia, Pa.
O. F. Wadsworth . . . . . Boston, Mass.
Prof. F. D. Clarke . . . . . New York, N. Y.

The President appointed as the Business Committee Drs. F. B. Loring, E. W. Bartlett and A. Alt.

The Treasurer's Report was read and referred to Dr. J. A. Lippincott as Auditing Committee. This Committee subsequently stated the report correct and the accounts properly vouched for, and the report was then accepted.

The Business Committee reported the bulletin of papers to be presented at the meeting in the following order:

1. Dr. H. Knapp, of New York, N. Y. On the Indications for Opening the Mastoid Process, based on some recent observations.

After the reading of this paper the President stated that two other papers appeared on the bulletin in relation to the same subject, and that he would call for the reading of these two papers, so that they might be discussed together.

2. Dr. J. A. Lippincott, of Pittsburgh, Pa., reported a case of Mastoiditis Interna Chronica, with Sclerosis—Trephining—Recovery.

Dr. A. H. Buck stated that on receiving the call for the meeting he found the titles of two papers on Mastoid Disease, and for that reason he had not written a paper, as he intended to do, but would make a few verbal remarks. These remarks opened the discussion, which was further participated in by Drs. Kipp, Theobald, Sexton, Jones, Seely, Andrews, Pooley, Mathewson, Fryer and Alt.

3. Dr. A. H. Buck, of New York, N. Y., read a paper, entitled "Remarks on the use of large doses of Iodide of Potassium or Iodide of Sodium, in cases of Rapid Loss of Hearing, supposed to be due to Syphilitic Disease."

Discussed by Drs. Pooley, Knapp, Sexton, Kipp, Jones, Mathewson and Andrews.

At 1.45 P. M. on motion of the Business Committee, the Society went into executive session to receive the report of the Committee on Membership.

The following were recommended by the Committee:

Drs. E. D. Spear, Jr., of Boston, Mass.
J. Van Duyn, of Syracuse, N. Y.
S. O. Richey, of Washington, D. C.

And they were all elected to membership on separate ballots.

At 2 P. M., the Society adjourned till 8 P. M.

Evening Session.

The Society was called to order at 8 P. M. The records of the morning session were read and accepted.

The Secretary read a letter received from Prof. F. D. Clarke of the New York Institute for Deaf Mutes, requesting to appear before the Society as a member of a Committee from the National Association of Articulation Teachers, with regard to calling the attention of the Society to the subject of testing the hearing of deaf-mutes.

Prof. Clarke was introduced to the Society and invited to a seat at the meeting.

The reading of papers was then resumed in the following order:

4. Dr. W. W. Seely, of Cincinnati, O. Jequirity treatment of Suppurative Otitis Media.

Discussed by Drs. Theobald, Knapp and Pooley.

5. Dr. J. J. B. Vermyne, of New Bedford, Mass. Disease of the Ethmoid, the consequence of Chronic Catarrh of the Naso-Pharynx. Exophthalmus.

Discussed by Drs. Knapp and Kipp.

6. Dr. J. J. B. Vermyne, of New Bedford, Mass. Myxofibroma from the Basis Cranii, causing Blindness and seven years later complete Deafness by destruction of the Labyrinth.

Discussed by Dr. Theobald.

7. Dr. Ch. J. Kipp, of Newark, N. J. Tumors of the Auricle; and

8. Dr. Lucien Howe, of Buffalo, N. Y. Haematoma auris.

Both papers together were discussed by Drs. Sexton, Pooley and Wadsworth.

9. Dr. S. Sexton, of New York, N. Y., showed some photographs of external fistula auris, malformations with unilateral atrophy of the face, naevus, malformation of the auricular cartilage, torticollis consecutive to otitis media purulenta, and reattachment of the auricle after almost entire severance from the head, with stenosis of the meatus.

He also made some verbal remarks on the influence of Dental Irritation on the ear, and exhibited an instrument for the removal of the tonsils. He further made a few observations on the use of Peroxyde of Hydrogen in ear diseases.

The following papers were read by title and referred to the Committee on Publications.

10. Dr. Ch. A. Todd, of St. Louis, Mo. Necrosis of the right labyrinth. Total facial paralysis on the same side. Partial cure.

11. Dr. Ch. H. Burnett, of Philadelphia, Pa. Reflex aural phenomena from naso-pharyngeal catarrh; objective noises in and from the ear.

12. Dr. H. N. Spencer, of St. Louis, Mo. A simple device for the treatment of nasal and post-nasal inflammations and on the importance which attaches to such conditions of inflammation as they are related to the ear.

13. Prof. F. D. Clarke, of New York, N. Y., read some remarks on the possibility of training and developing the hearing power, in the pupils of the schools for deaf-mutes, in whom a certain amount of hearing still exists, and on an instrument for testing the hearing.

Discussed by Drs. Sexton, Jones, Loring, Kipp, Bartlett, Theobald, Seely.

Dr. Howe moves that the subject should receive official recognition, by the appointment of a committee of three, the President of the Society to be one of the members and the two others to be appointed by him. This motion was carried and the Secretary requested to communicate with the President, Dr. Ch. H. Burnett, of Philadelphia, Pa., who had been prevented from attending the meeting by illness in his family.

Dr. Theobald showed some improved nose-pieces for attachment to Politzer's nasal douche.

Dr. Andrews and Dr. Sexton exhibited insufflators for the application of medicine in powder form to the ear.

The Business Committee reported the following list of officers for the ensuing year:

President	Dr. Ch. H. Burnett, Philadelphia, Pa.
Vice President	Dr. J. S. Prout, Brooklyn, N. Y.
Secretary and Treasurer	Dr. J. J. B. Vermyne, New Bedford, Mass.
Committee on Publications:	Dr. J. J. B. Vermyne, New Bedford, Mass. Dr. C. J. Blake, Boston, Mass. Dr. J. Orne Green, Boston, Mass.
Committee on Membership:	Dr. John Green, St. Louis, Mo. Dr. H. G. Miller, Providence, R. I. Dr. H. D. Noyes, New York, N. Y.

These officers were all elected on ballot.

The Society further decided to hold its next Annual Meeting on the day before the American Ophthalmological Society and at the same place.

The records of this session were read and approved.

At 11.45 P. M. the Society adjourned.

J. J. B. VERMYNE,
Secretary.

ON THE INDICATIONS FOR OPENING THE MASTOID PROCESS, BASED ON SOME RECENT OBSERVATIONS.

By. H. Knapp, M. D., *of New York.*

Last year's discussion on trephining the mastoid process showed that there was a great diversity of opinion among the members of this Society, greater than the accumulated experience of the profession seems to warrant. Some of the members went even so far as to question the propriety of the operation in general, and though others advocated it warmly, the general tenor of the discussion seemed to exhibit on the part of the majority of the members present, more skepticism than confidence in the results of this operation. I think it would be carrying coals to Newcastle, if any one to-day would propose to demonstrate the propriety of the operation in general. Every one of us will probably recollect more than one fatal case from tympano-mastoid disease, which he might possibly have saved by an early operation. A year ago I published a striking example of this proposition,* in which the superarbitrium of the autopsy clearly condemned the too conservative views which I had held up to that time. Formerly I was disinclined to operate when there were no external symptoms of suppuration in the mastoid region, and when in acute otitis media there was free discharge of healthy pus through the external meatus.

*Arch. of Otology, Vol. 12, p. 44.

I have changed my opinions not only on these two points, but even consider the operation indicated in certain cases in which the *Mt.* is intact, and no suppuration or fluid can be expected in the tympanic cavity and mastoid cells, I mean in cases of sclerosing or condensing (Buck) mastoiditis. Successful operations under these three conditions are on record, some from my own practice, yet they are not so numerous as to make the communication of new observations superfluous. I, therefore, beg leave to report one case of each of these three groups as evidence of the legitimacy of operating under such conditions.

Case I. Acute tympano-mastoiditis. No relief by paracentesis of the Mt. and by free discharge. Rapid cure by opening the mastoid and liberating a great quantity of pus.

Mr. Jac. J., aet. 33, sewing machine operator. On April 18, '84, was very busy, heated, sitting near a window, caught cold by the draft, immediately followed by pain in left ear, saw a physician on the same day on account of it, who ordered poultices to the ear; pain most intense at night, could not sleep. The next day poulticing and bathing the ear with warm chamomile tea; unable to work. The fourth day came to dispensary of N. Y. O. & A. I. I found intense otit. med., ordered leeches to be put behind the ear, staying in bed, diaphoresis and warm ear baths. The pain did not diminish. The *Mt.* was more or less uniformly red and bulging. On April 29th, I incised it and liberated a considerable quantity of liquid pus, especially by means of Politzer's experiment. The pain was not materially diminished and settled more and more in the left side of the head up to the median line. The discharge from the ear continued unabated, and the post-aural region began somewhat to swell and became tender on pressure. No ophthalmoscopic abnormity. The continuance of the severe headache determined me, *in spite of the free discharge from the ear* and the absence of disturbance in the fundus oculi to open the mastoid process, which was done with a chisel, on May 23d, not quite five weeks after the onset of the acute otitis. 1 *cm.* behind the auricle an incision of 4 *cm.* was made through the skin down to the bone. The bone proved healthy in its outer layers, but the more deeply I penetrated, the more vascular was the bone. At the depth of about 1 *cm.* I struck thick creamy inoffensive pus, which on enlarging the opening welled

out in large quantity. I cleansed the wound and inserted a perforated silver tube. The patient felt greatly relieved and slept well. From the next day all pain had disappeared. Syringing through the wound brought out pus and hardened masses through the ear canal. The discharge rapidly diminished. Five days after the operation the silver tube was left off. On the eighth day the wound was allowed to close; on the thirteenth the patient was discharged from the hospital in regular convalescence. The wound in mastoid closed. No discharge from ear. He has continued well and on July 12th, 1884, twelve weeks after the onset of the disease and seven weeks after the opening of the mastoid his *Mt.* was fully restored, the handle somewhat red, the light reflex absent, the *Mt.* still somewhat dull, the scar in the mastoid region was linear and smooth, and the whole region of the disease as well as the head free from tenderness. *h* L $\frac{15}{24}$, R $\frac{30}{20}$, *v* $\frac{20}{20}$+, in each ear.

We may infer from the course of the disease in this case that the suppuration was more pronounced in the mastoid than in the tympanum, and that the swollen mucous membrane at the posterior wall of the tympanum admitted only of an insufficient escape of the matter produced in the cells of the mastoid process. Plenty of cases of this kind are on record in which perfect recovery took place without operative interference, even where the symptoms were much graver than in our case. I recall the gentlemen's mind to the case of Dr. Geo. F. S., reported a few years ago in the Archives of Otology by Dr. Roosa, in which the accompanying cerebral and general symptoms were quite alarming. Further I may direct the gentlemen's attention to a case treated by Dr. Fulton of St. Paul and myself, which they will find in the forthcoming number of the same journal. Besides well-marked cerebral symptoms, this patient showed bilateral optic neuritis more pronounced than usual when it is depending on aural disease. The duration of tympano-mastoiditis suppurativa, without an operation on the mastoid, commonly extends over many months and in many cases recovery is not attained before a spontaneous opening occurs; in some cases a lethal termination takes place which, we may reasonably infer, might

have been avoided by an operation. The opening of the mastoid in such cases is not only justifiable but clearly indicated when in *spite of perforation or paracentesis of the Mt. and a more or less free discharge the cerebral symptoms, in particular constant headache radiating from the mastoid over the side and back of the head, continue unabated for several weeks.* Whether or not the mastoid region be more or less swollen and tender to the touch, is of secondary importance, and seems to depend on the thickness and compactness of the outer table of that bone.

Case II. Chronic suppurative tympano-mastoiditis. No external abnormity. Chronic half-sided head-ache. Opening of mastoid, liberating puriform secretion. Relief.

Mr. W., aet. 36, engraver, New York, consulted me first Mch 22d, 1883, after having had otorhœa on the right side for 12 years. The flow of pus varied, but there was almost constant pain in the right side of his head lasting the whole forenoon, and interfering seriously with his work. In the afternoon it diminished, but at night it was frequently most intense. When he came to me he complained of pain in right parietal and frontal regions, not in the occiput, *h* o; *v* $\frac{1}{60}$. The inner (osseous) portion of the ear canal was narrowed, chiefly by bulging of the posterior-upper wall. Bottom of ear canal moist, pale; *Mt.* not recognizable in its details. Mastoid region healthy, not tender to the touch. The discharge from the ear had stopped during the last three weeks, and the headache had been greater, principally at night. I advised him to discontinue his work for a few days and try to restore the discharge by putting warm boracic acid water in his ear several times a day, and by steaming it in the evening. This in a few days brought back the otorhœa and relieved the headache. The posterior wall of the osseous portion still hard and swollen. Granulation tissue in tympanic cavity. The patient being very sensitive of pain, I did not scrape the granulation tissue out, but ordered alcoholic instillations to shrink it. This treatment had the desired effect. The granulations disappeared. Through a perforation in the *Mt.* the pale mucous membrane was seen. The hard and painless prominence at the posterior upper part of the canal appeared to be a mammillary exostosis. In six weeks I found the patient free from pain and advised him to stop treatment.

During the following winter the discharge occasionally returned and

the headache was intense. The condition was as before. Warm ear douches, boric acid, and alcohol did not relieve him much. The swelling at the posterior wall was distinct, hard and tender when touched with a probe. The caliber of the inner portion of the canal was greatly reduced, and at times the walls touched each other. The optic discs had always been normal. Though there was no abnormity in the mastoid region, I diagnosticated a chronic muco-purulent tympano-mastoiditis tending to sclerosis. Apart from the influence of possible retention of secretion I thought the opening of the mastoid indicated and performed the operation, of course with the patient's consent, on May 30th, 1884. I had to go through almost 2 *cm.* of compact bone substance, before I reached a cell of the cavity. A few drops of secretion which was more sero-mucous than purulent, escaped. The exploration with a probe showed that the cavity was very small, and ran irregularly for short distances in different directions, only anteriorly and somewhat upward the probe penetrated over an inch in length. The walls of the different recesses in the mastoid were hard and appeared thick. During the progress of the operation I could distinctly see that I had to deal with a sclerosing mastoiditis. The outer layers were compact and pale, but the more I penetrated the more hyperæmic was the bone. I did not wash the cavity out, for the secretion was purely sero-mucous, without any smell. After cleansing the wound I inserted a perforated silver tube and covered the whole region with absorbent cotton.

The patient was kept in bed two weeks, his headache was at once relieved. The wound and ear were syringed twice daily; the water injected into the mastoid did not escape through the ear nor *vice versa*, but of late the water injected into the mastoid was felt in the throat. The discharge through the ear ceased altogether, but that through the mastoid became more abundant, and had a more purulent character. The patient left the hospital four weeks after the operation, has resumed a part of his work. The canula is kept in the opening of the mastoid, cleansed and changed twice daily. Three times a week I syringe the mastoid and ear. This treatment will probably have to be continued for months to come. The wound has a perfectly healthy aspect and the patient feels comfortable. He has still some pain in his ear, but his previous headache has disappeared. I intend to incise the protruding part of the posterior wall of the ear-canal, and to wash out the tympano-mastoid cavity by injecting warm salt water (½ per cent.) with a catheter through the Eustachian tube, if the recovery is slow.

The probe and sharp spoon which I introduced into the mastoid cavity never detected any cheesy masses, nor soft granulation tissue, nor sequestra. The diagnosis of chronic muco-purulent tympano-mastoiditis with scleros-

ing osteitis was verified. The prognosis is good, for the inflammation is likely to be cured when the sclerosis is complete, or even earlier. We see many such cases end in permanent recovery when a part of the mastoid cells have become obliterated by hyperostosis, while the others remain pneumatic.

In the third group of cases, sclerosing mastoiditis (condensing mastoiditis, Buck), the opening of the mastoid has proved beneficial in a number of cases that are on record, though the operation was not made under the strict diagnosis of this condition. The disease, as has long been known, is chiefly characterized by distressing headache, incapacitating the patient for any mental and even bodily exertion. There is little or no otorrhoea and the *Mt.* may be intact. Mostly the posterior wall of the osseous part of the meatus is swollen and hard, at times moderately tender to the touch; at others, not painful, according as congestion and infiltration of the periosteum is present or absent. Everyone who has performed a greater number of operations on the mastoid has met with cases of sclerosis where he penetrated deeply into the compact bone and had to desist without evacuating secretion, even without penetrating into any cavity at all. The relief which these operations afforded to the patient is ascribed to their "revulsive" action, what ever that may be.

In the following case I performed the operation intentionally for this condition and with perfect success.

Case III. Sclerosing mastoiditis; Mt. intact; constant severe headache; opening of the mastoid; complete relief.

In December, 1883, I was called by Dr. L. Weiss, of New York, to see in consultation a gentleman, Mr. B., 53 years old, of Williamsburg, who off and on had had some pain in and behind his left ear. For the preceding four weeks he had had intense pain in his left ear and mastoid, which

extended over the whole left side of his head; deprived him of sleep, and made him unfit for work. It was accompanied by dizziness, so that he had to stay at home. I found the mastoid larger than that of the other side, the integument slightly swollen and red; the ear canal narrowed by diffuse swelling of the posterior wall. The mastoid process tender to the touch, especially at its posterior margin. The *Mt.* was white opaque, handle and folds visible, cone of light absent, $h \frac{1}{x}$, $v \frac{20}{60}$. The other ear normal. Pharynx normal. Inflation by Politzer's experiment easy, giving neither relief nor improvement of hearing. The patient complained of excessive pain in ear, mastoid and head, dizziness, and loss of appetite. On account of the marked cerebral symptoms, we diagnosticated congestive internal mastoiditis, with participation of the periosteum, and proposed a Wilde's incision, to which the timid patient objected. We then ordered an anodyne for the night, leeches and cold applications to the mastoid region, and if this should fail to give him relief, warm water with some atropine to be put in the ear. The patient tried this and other treatment (poulticing, in particular) for four weeks without any benefit whatever. The pain in the mastoid and ear, the headache, and dizziness rather increased than diminished. He bundled up his head, moaned day and night, grew fretful and weak. At last he consented to have an operation performed. January 14th, 1884, I saw him again with his physician, and found the condition of the ear and mastoid unchanged, the subjective symptoms as just described. The absence of swelling and redness of the meatus, with only moderate and uniform swelling of the integument of the mastoid process, seemed to exclude a suppurative process, and we went to the performance of the operation with the understanding that we were not likely to meet any pus in the mastoid cavity, but expected only serous or sero-mucous, more probably no discharge.

The patient being etherized, I first made a Wilde's incision down to the bone. Finding the periosteum and outer surface of the mastoid normal, I at once enlarged the incision and chiselled an oblong hole into the bone close behind the insertion of the auricle. The deeper I proceeded, the more vascular the bone showed itself, and there was a good deal of capillary hemorrhage. At the depth of 2 *cm.* I felt the resistance diminished, and entered the cavity with a probe. I enlarged the opening with the chisel, and explored the cells. They were highly vascular, bled considerably, but contained no secretion. Capillary pulsation was very marked. We favored the bleeding by applying plugs of absorbent cotton steeped in warm water. When the bleeding stopped, we cleansed the wound and bandaged it with absorbent cotton. It healed without suppuration.

The patient felt weak the next day, but had lost his headache and dizziness. In the course of a few weeks he went to his business again. Three months later he came to my office, stating that he was completely cured, and now quite a different man. There was a plain linear scar, no swelling of the mastoid nor in the ear canal, the *Mt.* was whitish, the light spot dull; $h \frac{12}{24}$; $v \frac{20}{20}$.

My communication, Mr. President and gentlemen, has been longer than I intended it to be, yet if I do not trespass too much on your valuable time I would like briefly to describe the **mode of operating.** I make the incision *within* 1 *cm.* from the insertion of the auricle. When there is no place distinguished by peculiar swelling or softness, I choose the little depression behind the upper level of the meatus, known as Desarennes' pit, to penetrate into the interior. The periosteum is detached and pushed aside with a chisel. The lips of the wound are held open with Desmarres' rakes for the obliteration of the lachrymal sac. Of late years I have used only the chisel for opening the mastoid. The chisels which I use are smaller than those described by authors. In the removal of ivory osteomas I have found that small chisels work more effectively and are less easily notched than larger ones. They must be of the best of steel and very sharp. The wound in the bone is made oblong with the longest diameter in the vertical direction, and the direction of the force of the chisel is half the time from above down, the other half from down upward, rarely lateral. The wound-canal has a forward direction, parallel to the ear-canal. This works a navicular defect in the bone, and easily strikes the autrum, the direction of which it cuts at right angles. The walls of the defect are perfectly smooth and clean, for the splinters are removed with the chisel itself. The blood is dipped up with a fine so-called silk sponge, than which there is no better cleansing and absorbent material on earth. Your absorbent cotton does not absorb pus, as everybody knows, and is apt to deposit fibres on the surface with which it comes in contact. Remember the cotton fibres on microscopic slides. A good sponge is the greatest luxury, not only for a clean man, but also for a clean surgeon. Taking care that my sponges are clean and aseptic—and I know how to keep them so—I challenge any criticism con-

cerning their use. If I want the wound to heal by first intention, I unite its lips with a continuous suture of fine black silk. This is intended after operations for merely congestive sclerosing processes, or when in non-suppurative otitis the cranium has been opened. In acute suppurative otitis the immediate evacuation of the pus is sometimes sufficient to cause a speedy recovery. In these cases, therefore, I simply cover the wound with absorbent cotton, waiting to be guided in the further treatment by the course of the disease. Only when there is old suppuration, or profuse suppuration sets in a few days after the operation, do I syringe the mastoid cavity out, and insert a perforated silver tube, keeping this treatment up until the discharge has ceased. I use during the operation, and for cleansing purposes, antiseptic substances of the mildest nature, avoiding everything that by chemical irritation can irritate the tissue and interfere with the circulation and nutrition of the parts. As such substances I mostly use a $\frac{1}{2}$% solution of chloride of sodium or a solution of boracic acid. When suppuration or putrefaction was present before or after the operation, I have mostly used iodoform powder.

A CASE OF MASTOIDITIS INTERNA CHRONICA WITH SCLEROSIS. — TREPHINING. — RECOVERY.

By J. A. Lippincott, M. D., *Pittsburgh, Pa.*

As a result of the labors of Schwartze, Buck, and a host of other workers in the otological vineyard, mastoid surgery has, within a couple of decades, attained a gratifying degree of exactitude; and many a sufferer has been rescued from death, who, a quarter of a century ago, would have been abandoned to his fate. It is now pretty well established that if pus or the reddish pulpy substance which tends to undergo purulent degeneration be strongly suspected to be present in the mastoid cells, the latter should be exposed by some operative procedure, and an exit provided for the morbid material. And probably the cases are exceptional in which the diagnosis of the conditions just mentioned cannot be made with considerable confidence. But this statement by no means applies to eburnating mastoiditis which presents no symptom or group of symptoms that can for a moment be termed pathognomonic. Moreover, even if the diagnosis be very positively made, the record of operations for this condition is still too meagre to serve as a basis for absolute therapeutic conclusions. Indeed, the only recorded instances to which I have had access are those published by Schwartze in Arch. f. Ohr. Vols. xiii. and xviii., and by Knapp in the Arch. Otol. Vols. x. and xii.

In view of the obscurity that surrounds the subject, there-

fore I have thought proper not to hide under a bushel even the rush-light of a single case.

Miss N. aet 19, a young lady residing a distance of 20 miles, presented herself March 15, '83, complaining of pain in the right ear, not constant, and of moderate severity, which she said had lasted for several months. She had never had any particular nasal or throat trouble. Indeed she had always enjoyed good health and her family history was of the best. On examination there was found a quantity of impacted cerumen. The watch was heard only on contact with the auricle. On removing the wax, the external canal and *Mt.* exhibited rather more than the usual degree of redness and irritation, and the hearing was but slightly improved, $h = \frac{1}{30}$. The left ear was in all respects normal. Inflation of the middle ears, which was accomplished both by Politzer's method and with the catheter, was not felt by the patient on either side. I may remark parenthetically that during the whole subsequent progress of the case the patient was never conscious of air entering either tympanum, although this phenomenon was demonstrated to my own satisfaction by means of the otoscopic tube. The naso-pharynx was slightly catarrhal. A solution of boric acid and sodium biborate was directed to be instilled several times daily, and the patient was requested to return if the pain did not subside entirely.

About five weeks later, April 17, Miss N. returned. She stated that the pain, which had been but partially relieved after the first visit, had two days before, April 15, become greatly intensified. It was referred partly to the region of the middle ear and partly to the mastoid process, occasionally shooting over the whole side of the head. I found considerable swelling in the neck below the lobule, and a less degree of tumefaction over the process. This whole region was sensitive, but there was no discoloration of the skin. The external auditory canal was healthy

looking, except that it was swollen, and its calibre thereby somewhat diminished. The *Mt.* was absolutely free from congestion. The light-cone was absent, but the anterior two-thirds of the membrane showed a silvery lustre. The middle ear was easily inflated. There was light acceleration of the pulse and other symptoms of moderate febrile disturbance. I suspected the existence of some form of mastoid inflammation, but concluded not to make Wilde's incision, as the patient had a distance to go. I therefore directed free leeching and the application of poultices, and prescribed the mild chloride and a febrifuge mixture containing aconite. Under this treatment the swelling and other acute manifestations rapidly subsided.

On the 28th of April, eleven days having elapsed since the last visit, the condition was as follows: There was almost constant dull pain, felt partly in the mastoid region, but partly also deep in the ear as before. There was no appreciable swelling over the mastoid, but the latter was sensitive to pressure and tapping. The external canal was normal in appearance and not specially tender at any point. The membrane presented the same silvery lustre and the same freedom from congestion as at the last visit. Siegle's speculum demonstrated normal mobility. Hearing, $=h\frac{2}{30}$. Tuning fork on vertex heard best on right, *i. e.* affected side. Other nerve tests gave uncertain results, but about this one there was no doubt. Examination of the teeth negative.

I shall not take up your time with a detailed account of the case during the succeeding months. The symptoms remained substantially unchanged, save that the pain, though sometimes better and sometimes worse, gradually increased in intensity, assuming at times a neuralgic acuteness, but never a throbbing character, and became more localized in the mastoid region. It was never felt over the side of the head after the acute attack described above.

The hearing slowly failed till finally the watch was heard only on firm pressure. There was at no time any dizziness or uncertainty in walking, or any condition in the eye-ground or elsewhere pointing to cerebral involvement. Facial movements and the sense of taste were unaffected. No swelling (after the attack previously referred to) ever appeared over the mastoid process that could not be accounted for by the local applications made—and these were many, including blisters, tincture of iodine, ointments of tartar emetic, mercurial biniodide, and belladona, the seton, incision with dissection of the periosteum, etc. Internally, alterative, roborant, and anti-neuralgic remedies in various forms were administered in succession, and inflation was practiced, all with the same dismal result.

As time wore on, the long continued suffering began to tell on the patient—naturally a very spirited girl—producing anorexia, loss of weight and mental depression. Influenced in part by these considerations, and in part by the solicitations of the patient, having explained to her some time before the one resource remaining, I decided to open the mastoid. Accordingly, March 20th, '84, with the assistance of her physician, Dr. Galbraith, and Dr. J. W. Kerr of Pittsburgh, the patient was etherized, and an incision an inch and a half long made half an inch behind the auricle. The periosteum was firmly adherent, and was dissected off with some difficulty. The conical trephine was then applied at a point one-third of an inch behind the meatus, a little below the upper wall; but, the osseous tissue being extremely dense, very slow progress was made, and the trephine was soon abandoned for Buck's drill. The latter was directed inwards, forwards, and a little upwards. After penetrating to a depth of 1 *cm.*, the structure of the bone became less dense and ivory-like, but unmistakable mastoid cells were not encountered, although the drilling was continued to a depth of 17 *mm.*

The opening in the bone was cleansed, and a tent moistened with carbolized oil was inserted, and a poultice applied.

On recovering from the ether and from the immediate effects of the operation, the pain, which had been so long the patient's constant companion, was found to be greatly diminished; and in the course of a few weeks it entirely disappeared. The poulticing was kept up till May 16th, by which time the opening in the bone had filled up so that the tent could no longer be inserted. The wound was therefore allowed to cicatrize. Three weeks later, in consequence of exposure incident to nursing a very sick relative, there was a slight return of the pain, and the mastoid region was somewhat tender. An ointment of the extract of belladonna and the yellow oxide of mercury was applied freely twice a day to the affected part, and the pain and tenderness subsided promptly.

At the last visit, July 8th, the patient declared herself perfectly free from distress. The hearing was $h\frac{5}{30}$. The gradual improvement in audition has been so decided as to occasion remark from time to time from her friends.

About two weeks after the case came under my observation slight pain began to be experienced in the left ear, and the hearing was reduced to $h\frac{15}{30}$. No congestion or other marked abnormality of the *Mt.* was observable. The trouble soon yielded to the measures employed — astringents to the naso-pharynx and catheterization; and the hearing became, and has remained, normal.

DISCUSSION.

Dr. A. H. Buck, New York, N. Y., says he noticed one point in Dr. Knapp's paper which suggests a point of practical interest. He draws the inference from some remarks which Dr. K. made that he made efforts to secure union by first intention in one of his operations, and this leads him to mention the view which he has always entertained in regard to operations in the mastoid process, viz.: that the beneficial effects of the operation were partly dependent on the subsequent irritation and drain from that region, and his efforts have therefore always been rather in the opposite direction, viz.: to promote discharge and prevent union by the first intention. He was therefore surprised to hear Dr. Knapp mention that point. Perhaps he may be wrong in drawing the inference that he desired to secure union by first intention and that it simply took place as an accident. His own opinion is that one of the decided benefits attached to the operation on the mastoid process is that it secured for a period of days, a certain amount of surface irritation which can do the patient no harm, but which is a very powerful counter-irritant in respect to the deeper seated process, which may do the patient harm.

Dr. Chas. J. Kipp, Newark, N. J., has come across several cases where there was but little external indication of trouble, and yet in which after separating the periosteum, he had found evidence of caries or necrosis of the bone. He selects these places for going into the mastoid process. He thinks by doing so we run much less risk of doing harm. In a case which he operated on some years ago, the man had suffered from excessive headache and pain behind the ear about two inches behind the mastoid. There had been a discharge from the ear, but this had entirely ceased. The drum-membrane was inflamed and much thickened, but not perforated. In this case, he separated the peri-

osteum for a considerable distance behind the ear, and about an inch back of the attachment of the auricle he found a point which was soft and of a dark color. At this point, a place which nobody would select ordinarily, he scraped away the soft bone and by chiseling a little entered a sinus which led to the mastoid process. He did not have to go far before he struck pus. Placing a syringe in the sinus and injecting salt water, it issued from the nose, showing that the middle ear was free in this case, and that the disease was confined to the mastoid. As soon as the operation was performed, the man obtained relief and in three or four weeks was discharged. In this case, there was optic neuritis on one side only. This is the only case in which he has seen this. The optic nerve on the affected side was decidedly injected and swollen, the opposite one being healthy.

Dr. Samuel Theobald, Baltimore, Md., states that he does not know whether or not Dr. Knapp gave a full report of his cases, but assuming that he did tell all that he intended to in regard to treatment, especially of the Williamsburg case, and another case which preceded that, the impression made upon him, and the same thing has struck him in reading accounts of cases in which it was necessary to open the mastoid process, was that constitutional remedies appear to have been overlooked. In the case of the Williamsburg patient he believes no mention has been made of constitutional treatment. The case was one of long duration with pain in the head and back of the ear. There was of course periosteal inflammation. There was no suggestion of syphilis, and no doubt that point was inquired into. At the same time, in the interval between the date of the first examination and the time when the mastoid was opened, much might have been done by constitutional treatment. The other case impresses him the same way. Dr. Lippincott speaks of having tried constitutional

remedies in his case. In just such cases where there was periosteal inflammation involving the walls of the mastoid cells, and perhaps with some associated ostitis he had been able to obtain most excellent results by using constitutional remedies, especially preparations of mercury, such as the biniodide of mercury in connection with iodide of potassium. This has been the most efficient remedy in his hands. Sometimes, where it was necessary to make a prompt impression, he has given the mild chloride and touched the gums slightly, and followed it up with external applications of blue ointment or the oleate of mercury.

It seems to him that the Williamsburg case might have been just such a case as would have been greatly benefitted by a course of treatment similar to the one which he had suggested, and this might have obviated the necessity for opening the mastoid process. Many of these cases can be cured by the use of such constitutional remedies, with the local abstraction of blood, and perhaps with the local application of mercurial preparations.

Dr. Samuel Sexton, New York, in continuing the discussion, showed the Society several photographs of neglected cases, brought to him for treatment. It will be seen by looking at these photographs, that nature has nearly always selected the point for the escape of matter, which Dr. Knapp has alluded to as being the proper place for making an opening in the mastoid. In some of these cases the cure was spontaneous. A fatal result had occurred in one case, from meningitis in a child four months old, where otorrhoea had existed for some time.

Sequestra were found in some of the younger subjects and were removed either through the opening in the cortex of the mastoid or through the external auditory canal.

It was well that Dr. Knapp had drawn the line between neglected cases and the cases in which the operation is done to prevent brain-difficulty. This would lead to more

clearness in discussing the subject of mastoid disease than on previous occasions. Dr. Knapp proposes, as he himself has just stated, to open the mastoid in certain conditions, in order to "save the patient." He cannot agree with Dr. K. in one of the points which he brings forward, namely :—That we are warranted in boring into the mastoid process in a case which, mainly from the presence of pain, and perhaps some other less important symptoms, we suppose that intra-cranial inflammation exists. He thinks there is considerable difference of opinion in respect to this matter, and that some Otologists have followed the German method of early heroic interference too far in this matter.

In regard to the question of operating on cases of supposed mastoid disease :—it has been his experience that in a large number of cases of severe purulent inflammation of the middle ear, it has been very apparent that the mastoid cells were involved. Now as regards the symptoms that occur when the mastoid cells are supposed to be involved, and when there is no external evidence of disease, it has been insisted by a considerable number of observers that pain alone is a sufficient indication for which we may make a perforation in the mastoid for the prevention of more serious results. He thinks that we cannot rely on this symptom as a guide in all cases, and in fact, in scarcely any.

He has in mind a case in which there was intense pain in the ear. The tympanic membrane was dusky, but not inflamed. There was no external appearance of disease, no swelling, but still there was deafness and some deep seated pain above the ear. He perforated the drum, but there was no discharge of matter. The patient went home, and he received a letter from his physician, stating that he had died inside of ten days, from some disease of the brain. The post-mortem showed an abscess without any special mastoid trouble. There had been, probably, from

the severe neuralgia, meningitis with subsequent abscess of the brain. He can not imagine that any operation on the mastoid would have afforded the slightest relief in this case. In a considerable number of the fatal cases, a similar condition seems to have been present and operation on the mastoid would certainly have been of no service. The deep seated pain seems to come from the general neuralgia affecting the meninges of the brain and is not always significant of mastoid complication.

As to indications, where there is manifest inflammation of the cells, where there is some external symptom, he has frequently found pointing early in the course of the disease into the external auditory canal and from an opening in this situation, the purulent secretion will escape as satisfactorily as through an opening made in the cortex of the bone. Such has been his experience in many of the cases that he has treated.

He exhibited here the photographs of a case which reminds him very much of one of Dr. Knapp's cases. When he examined the patient, he found that the membrane was not perforated, there was swelling over the mastoid, a good deal of pain in the head, and the patient was running down and in bad condition. There was evident inflammation of the mastoid. He opened the membrana tympani, thus permitting free drainage, placed him on calcium sulphide and ordered out-door exercise and a nutritious diet. The case went on satisfactorily, until a slight increase of the swelling over the mastoid induced him to make an incision, which he did, liberating a small amount of pus. This soon healed, and under constitutional treatment, without having been laid up a single day, the patient got entirely well and the hearing was completely restored. In this case, he relieved the pain with small doses of tincture of aconite. This was persisted in for several weeks. Four or five drops were put in a glassful of water. Of this he

took a dose every fifteen minutes until relieved, the maximum dose probably being about one-fourth of a drop of the tincture of aconite. He continued the calcium sulphide some six weeks or two months. He has had scarcely any experience in the use of mercurial preparations in these inflammatory conditions about the ear. He has been well satisfied with the use of calcium sulphide, which he has continued to employ in his practice for the past eight years. In nearly all of these mastoid cases it has acted with entire satisfation. He presumes that it is because he relies on this constitutional treatment and the general care of the patient, that he has found it unnecessary to perforate the mastoid cells. In a great many instances where the mastoid cells are involved, the tympanic membrane has not been perforated. In the patient which he showed last year, there was no perforation of the tympanic membrane, but there was severe inflammation of the mastoid and of the periosteum covering the mastoid process and over the squamous portion of the bone; sinuses had formed. The patient suffered from ozena and was much run down. He gave him calcium sulphide for a long time, and acted upon the general surgical principle that where there is sequestrated bone it should be gotten rid of. He should do this in any case of mastoid disease. Where he was not certain of the presence of pus, he should not perforate the mastoid process in order to get drainage which can be obtained in other ways.

In regard to the eburnation alluded to, he thinks that perhaps where the trephine is passed very close to the canal, the dense bone which is natural to these parts may be found. He fancies that this is the explanation in some cases.

He can not imagine that opening up these parts on account of "condensing" will be of service in middle ear trouble or in brain affections.

Dr. Knapp has alluded to one point which he does not understand, and that is the capillary pulsation spoken of. He had always believed that this pulsation was dependent on the pulsation of the carotid artery imparted to the fluid. He should be glad to have Dr. Knapp explain that at his convenience.

Dr. Samuel J. Jones, Chicago, Ill., remarks: It seemed to him that our embarrassment has been more in chronic than in acute cases. The question is as to the propriety of perforating the mastoid cells in those cases of chronic trouble accompanied with neuralgic pain under some exposure. In the same way, we have affections of the teeth where we find no caries, with recurrent neuralgic pain. In these cases it is sometimes more difficult to make out a satisfactory diagnosis than in chronic inflammation or even in sub-acute inflammation. Of course if there is great tenderness, swelling and redness, the only doubt would be whether it would require a simple incision to the bone or whether the disease is more deeply situated. It is, to a great extent, a question of careful diagnosis. In some cases a simple incision will relieve. In other cases, we shall find pus there. In other cases, relief will not follow and there is a strong presumption that there is an inflammatory process beneath, and perforation is justifiable. In many of these cases in which we are in doubt, alteratives, and tonics with persistent vesication over the mastoid process will often afford relief without perforation of the mastoid cells. Of course, he assumes that the examination is careful. He once had a case of suppurative inflammation of the middle ear, with aggravation of it in which suppuration with perforation of the drum-head supervened. The patient was almost entirely well when he last saw her. During his absence from town, she had an aggravation of her trouble and another physician was called, who thought that the suppuration had involved the mastoid cells, and

not making a careful examination, punctured the mastoid, but found no pus. A more careful examination revealed the seat of the pus. This was evacuated and the opening healed in a few days,—the opening in the mastoid healed in a few months. This was an unfortunate mistake. He imagines that the want of a careful examination is the chief source of embarrassment in many of these cases.

Dr. W. W. Seely, Cincinnati, O., has not seen any of these cases in which there is no suppuration to be made out. His experience has been almost entirely with those cases in which there was evident suppuration. In these cases, it seems to him that there is embarrassment as to what shall be done, whether the mastoid cells shall be opened or not. He has seen the most grave conditions recover without an operation. The expression of some of these views last year has led Dr. Knapp to a forced interpretation of them, if not to a mistaken one. *Per se*, it is a simple operation. There is no difficulty in making the perforation. In regard to guides, no man can get them except by making them himself personally. Every individual must select his method of operation and select the point in the given case. As far as he has read and heard upon the subject we are not able to formulate any rules which will make the personal experience of others available to ourselves. They are good in a general way. He has had a case which shows the difficulty in deciding. A man came to him from Indiana with facial paralysis, suppuration from the ear of rather long standing, and intense neuralgia. He cleansed the ear out, but something prevented him from making the operation. The following day he returned, stating that he was no better. He again cleansed the ear, and for some reason again failed to perform the operation. He concluded to give a pretty large dose of quinine, and gave him twenty grains. The following morning he came in perfectly well so far as pain was concerned, and he has not had pain in

the ear since. This occurred just before the Shrady case. The man still has the facial paralysis and a little suppuration. So far as treatment goes, he agrees with Dr. Theobald, except that he makes use of local applications instead of constitutional. His local application is extremely hot water. He has seen the apparent indications for opening, rapidly disappear under the application of heat.

Dr. J. A. Andrews, New York, says that in regard to indications for operating on the mastoid in those cases in which external symptoms are not pronounced, after the meeting last summer, he had an experience which enabled him to add another case to those which he reported at the last meeting, as illustrating the value of an ophthalmoscopic examination. This was the case of a boy with purulent middle ear disease which had existed for a period of eighteen months. On the occasion of his third visit, it was stated that he had had pain and restlessness for the two previous nights. On examining the eye he found the disc swollen. There was no redness over the mastoid and no indication of an opening in the external auditory canal. He took this condition of the disc as an indication for opening the mastoid. There was no pronounced neuritis, but slightly swollen disc. He opened the mastoid and was gratified to find something which justified him in operating. He found but little pus, but a great deal of broken down tissue. Some weeks subsequently, he removed a sequestrum about the size of the last phalanx of his little finger. He recovered entirely.

Dr. Sexton would like to know what condition of the mastoid cells it is that may produce inflammation of the optic nerves.

Dr. Thomas R. Pooley, New York, N. Y., states that Dr. Kipp has made a remark which reminds him that he has had a case of one-sided neuritis. The mastoid process had been perforated for suppurative disease. Before

the perforation of the mastoid there was no affection of the eye. Examination made afterwards showed well-marked optic neuritis—choked disc in the first stage. He should like to say that after the perforation the patient had symptoms indicating inflammation of the lateral sinus, and that this may have caused the neuritis. After a troublesome period extending over months the patient fully recovered.

Dr. Kipp remarks that what Dr. Andrews has said in regard to optic neuritis is undoubtedly true, but he has had a number of cases of suppurative disease of the mastoid and abscess of the brain in which death has occurred, and yet there was no optic neuritis. As to the cause of this condition, in answer to Dr. Sexton, it is assumed that in all those cases in which there is optic neuritis that there is inflammation or hyperæmia of the dura mater, or the other membranes, or even of the brain tissue itself. The condition has also been observed in cases of thrombosis of the lateral sinus.

Dr. Arthur Mathewson, Brooklyn, N. Y., reports his experience as coinciding somewhat with those mentioned. In most of the fatal cases which he has seen and in which there has been an opportunity for a post-mortem, this has not revealed any mastoid trouble. The post-mortem did not indicate that the mastoid had anything to do with the fatal termination. Where there is mastoid trouble, the pus will often force its way through without the necessity of any operation except cutting through the soft tissues or enlarging the opening. On the other side, in cases where there was sclerosis, which he had seen operated on, the results have not been such as to encourage him to do the operation often. He has been waiting to be convinced by experience, but his experience has not taught him that it is desirable to take what he regards as risks. He has a specimen which he has presented once or twice to the New York Otological and Ophthalmological Society which he always keeps in

mind. In this the lateral sinus is so deep that an operation at the point of election would break into it at once. He cannot help but think that we must take some risks, and he has not seen enough benefits from the operation to incline him to take that risk often.

Dr. Kipp says that a case comes to his mind showing the necessity of care in taking optic neuritis as an indication for operating on the mastoid. Some six months ago, a child was brought to him for conjunctival trouble. The ophthalmoscope showed marked optic neuritis of both sides. Subsequently inflammation of the middle ear developed. If any one had seen the case then for the first time, he might have thought the optic neuritis the result of the ear disease and taken it as an indication for perforating the mastoid, when, in reality, the trouble with the optic nerves had existed long before the middle ear disease developed.

Dr. B. E. Fryer, Kansas City, Mo., believes that one point has been omitted in regard to the early opening of the mastoid. Where we have any purulent mastoid trouble, accompanied by running down of the general health, he thinks that we should operate early. Otherwise, we run a risk of bringing about pyæmia, for this is apt to follow where there is a depressed condition of the general health and we cut into bone. On the other hand, he thinks that one of the contra-indications to the operation is a marked deterioration of the health, in which a pyæmic condition might readily be excited. He takes it that all these cases of optic neuritis follow blood poisoning, but not necessarily meningitis or cerebral complication.

Dr. Andrews adds that with regard to the last remark of Dr. Fryer, it is a fact that whatever the cause of the optic neuritis, there is a recession of the trouble soon, if not immediately after operation.

In regard to Dr. Kipp's remark about patients with cerebral abcess, but without any signs of intra-ocular dis-

ease being present, we recognise that fact, inasmuch as a number of cases illustrating it have been reported. He does not wish to imply that every case of middle ear trouble should be operated on, but he does mean to say that the condition of the optic disc should be made an indication for the operation. He does not say that we should wait until there is pronounced neuritis, but where in suppurative otitis media, the signs of mastoid disease not being pronounced, there is swelling of the disc, he thinks that we are justified by the results in operating in such cases; that the eye trouble disappears, whether it be due to blood poisoning or to other causes.

Dr. Seely would like to ask Dr. Andrews whether he would use this symptom as an only indication. At the last meeting it was the pretty uniform opinion that optic neuritis could not be used as an indication for perforating the mastoid. Nearly every individual has reported cases in which swelling of the disc was not present in many cases, others in which it was present on one side and not on the other, sometimes on the same side and sometimes on the opposite, and cases in which it appeared and disappeared. It was agreed that it could not be taken as an indication for opening the mastoid, and that something else had to be made use of beside what was found in the fundus oculi. He would like to know if he would use that symptom alone or be largely determined by it in perforating the mastoid.

Dr. Andrews answers that he should certainly in a case like that which he has described, in which there was restlessness, some elevation of temperature, headache, but no tenderness over the mastoid, the pain being confined to that side of the head, associated with the named condition of the optic nerves, take this as an indication for operating.

Dr. Sexton says he was in hopes that some one would

give a satisfactory reason for using this as a means of diagnosis. He had thought over this matter a good deal since the discussion of last year. It does seem to him that this meningeal trouble is consecutive to the mastoid disease, and that the optic neuritis arises from the meningeal trouble and not from the mastoid affection. If this were the case, the injury would have been done and there would be no advantage in operating.

Dr. Kipp observes that a number of patients have recovered.

Dr. Sexton answers that the patient may recover from meningeal trouble.

Dr. Kipp states he has reported a case in which a child recovered with optic neuritis.

Dr. Knapp says the optic neuritis is evidently a symptom of brain trouble, and the brain trouble is secondary to the ear trouble. The fact is that both the ear trouble and the disease of the brain may get well. He has seen a case in which there were very severe cerebral symptoms. The patient got over the attack, but three weeks later he found still optic neuritis. He refrained from operating because the patient was improving. He acted on the principle of letting well enough alone. The patient went South, was under good hygienic conditions and recovered completely. Dr. K. thinks that operative interference is indicated when the cerebral symptoms grow worse or at least persist for a length of time. It is only when the case gets better that he lets it alone.

The cause of optic neuritis evidently is some kind of inflammation within the cranial cavity which is induced by the mastoid disease just as cerebral abscess is. The condition may not be so advanced that death will result, which commonly results from abscess. These cases may recover, but when the patient is not in a decided way of recovery, he thinks that the presence of optic neuritis is one of

the strongest arguments for operating and removing the cheesy or necrosed matter.

Dr. J. S. Prout, Brooklyn, N. Y., asks if Dr. Knapp could tell us anything about the fatality of the operation itself?

Dr. Knapp refers to Schwartze's statistics of 100 cases, in which the author, as far as Dr. K. remembers, attributes only one fatal case directly to the operation.

Dr. Sexton says he cannot yet see the necessity of operating on the mastoid for disease of the brain. In many of these cases, the cerebral abscess or meningitis has not extended from the mastoid cells, but is possibly secondary to the intense neuralgia reflected from the tympanic plexus in acute otitis media. He cannot think that it can be of any service to perforate the mastoid cells in these cases. Moreover, if the mastoid cells are affected and we have had consecutive brain trouble, we should not be warranted in operating on the mastoid cells, for the injury has been done and there are other ways of curing mastoid disease than by trephining.

Dr. A. Alt, St. Louis, Mo., remarks that it is not absolutely necessary to have meningitis to produce optic neuritis. Simple hyperæmia of the meninges may be sufficient. Remove the original cause of the hyperæmia and the condition will be decidedly benefited. He takes it that in these cases the operation is beneficial. When there has been meningitis, the case will not be so apt to recover.

Dr. Knapp says he does not believe that optic neuritis can be a consequence of neuralgia.

Dr. Pooley does not believe that neuralgia ever produced cerebral abscess.

Dr. Sexton says he has referred to cases which he has reported, in which there was meningitis and cerebral abscess, without the mastoid being particularly involved. The cerebral symptoms were evidently dependent upon the

reflex sympathy from the mastoid. He does not see why we cannot have intense neuralgia through the fifth pair reflected and producing inflammation.

Dr. Kipp remarks that it is well known that in many of these cases the disease travels through the tegmen tympani, without affecting the mastoid at all.

Dr. J. A. Lippincott, Pittsburgh, Pa., would like to make a remark in reference to the treatment of those cases where eburnation is supposed to be present. There appears to be a strong tendency to think that these cases can be better treated by alteratives and other methods. He has had no experience, save in the case which he reported. In that case he used iodides and mercurial preparations for one year. He also used almost every form of anti-neuralgic medicine. Everything had plenty of time, but they produced no benefit. He has seen cases of reflected dental neuralgia, and he was careful to have the teeth examined by several competent dentists. Notwithstanding all remedies and topical applications, improvement did not follow. Finally he was obliged to operate, and the result was so good that he does not think that this method of treatment should be lightly disposed of, unless there are strong reasons against it.

Dr. Buck says he is afraid that the society is almost sick of the subject, still there are one or two points which may be said about it. He will briefly give his plan of procedure in these cases. These cases may be divided into acute and chronic. The first question that he puts to himself is this: Has this attack occurred in a person who has had a purulent discharge from the ear for years, or has it appeared in a person whose ear is perfectly well? When that point is settled, you have gotten a great way. If the patient has had a purulent discharge for years, you can at once exclude a number of symptoms which otherwise would be of value. In such cases, you need not expect

to find tenderness and redness behind the ear, and swelling of the glands or redness along the side of the neck. These symptoms may be present, but they are more often absent; and despite their absence there may be serious disease in and around the antrum, demanding operation on the mastoid process.

The next practical question which suggests itself is, assuming that there is sclerosis there, is the remote seat of purulent discharge provided with an adequate opening? If you can satisfy yourself that the outlet for matter shut up in the middle ear or the antrum is not adequate and the pain is persistent and the health is deteriorating, then he thinks we should not hesitate one moment in going through the sclerosed mastoid process and establishing an adequate opening down to the antrum. It has been suggested that the opening may be made from the external meatus. His experience has usually been that this is not practicable. He has tried this and has set up terrible inflammation which he had difficulty in allaying. The parts soon begin to swell and there is then no escape for matter from that region. In a word, the original condition of inadequate drainage is thereby restored and we find ourselves no nearer a solution of the problem than we were at first. The only region through which we can go safely and establish an adequate vent is the mastoid process. He does not see how physicians can differ on that point. When satisfied that there is sclerosis, we must be guided, not by what are usually supposed to be important indications of serious deep seated disease, nl. the external evidences of inflammation, but by the persistence of pain, by the evidences of such deep seated disease, which are visible in the auditory canal, and by the history of the case. If we find that the existing vent for the escape of matter is not adequate and the pain persists, cut through the mastoid process, even at the risk of causing the patient's death,

for he certainly will die if we do not operate and give him a chance for his life. However, the risk of the operation, if performed with care, is small.

Now we come to the acute cases, and there we have a right to dispute as to what shall be done. His own feelings would be towards early operation on the mastoid, because he considers that good surgery. He operates to give the patient a chance to recover speedily, to allay the pain and to have the hearing preserved. It is, however, a question for free discussion. The way he tries to guide himself is this. Assuming that there is acute inflammation, he asks himself if there is an adequate outlet for the matter. If there is imprisoned matter a large perforation in the drum-head may be made. Assuming that this has been tried and failed and that the pain persists, that there is continued discharge and the membrane continues to bulge, then what shall be tried? The failure of these efforts to give relief and the persistence of the pain makes it good surgery to go into the mastoid process. No matter how large an experience a man may have, he will not be able to say beforehand whether he will find pus in the mastoid cells or simply congestion. Whichever condition may be found, is a matter of indifference; in either case the procedure is in the line of good surgery. If pus be not found the operation will still do good by counter-irritation. He explains this on the ground of experience. He has never to his knowledge done any harm, but he has obtained the relief which he desired.

Dr. Sexton says that Dr. Buck's remarks present the question in rather a different aspect than before, if he performs this operation with a view of obtaining drainage from the antrum, rather than for the treatment and cure of eburnation or other mastoid disease.

Considering then that drainage is our principal object, we may best attain the result by proceeding to liberate

pent up secretions through the natural channel. The membrana tympani, may, of course, be punctured in vain, in these cases, since the tympanic cavity does not always communicate with the antrum mastoideum. Every one must have observed the bulging of the membrana flacçida in certain cases, and they were often grave cases, of acute inflammation of the middle ear; sometimes the protrusion was so great that the membrana tympani could not be seen, and the observer might, therefore, be much puzzled. If now we make a free incision into the posterior portion of the membrana flacçida, we may afford efficient drainage, from both the attic of the tympanum and antrum.

An incision into the membrana tympani, however, would be unavailing, since in these cases the upper portion of the tympanum is cut off from the lower portion by the swelling of the intervening structures. It is very seldom that the antrum cannot be drained in this manner, not only in acute, but also in chronic cases.

The antrum lies on a higher plane than the tympanum, and can therefore be best drained in this way. He has seen a large number of acute and chronic affections of this kind, and his experience is that they can be satisfactorily treated in this way.

Others have offered their experience as pointing to the advantage of trephining freely in these cases; he has himself successfully treated a large number of cases where the mastoid antrum and the pneumatic cells were involved, by the method alluded to before, and this experience is presented to the profession; they must, after all, decide for themselves.

Dr. Knapp observes he has been exceedingly interested in the remarks of Dr. Buck. His own observations in regard to acute otitis agree with those of Dr. B., and are clearly stated in his paper. In acute suppuration, if there is no external difficulty visible, if the discharge after para-

centesis seems to be free, and yet in spite of this the symptoms go on, we may assume that there is retention of pus, and the opening of the mastoid is legitimate. He operated in such cases with success. His second case, described in his paper, was introduced as an example of chronic suppuration with insufficient vent of the secretion through the tympanic cavity.

He agrees with Dr. B's statement that it is scarcely possible to enter the antrum through the osseous walls of the meatus, and the operation is apt to set up serious inflammation. It is a much more difficult operation than that on the mastoid process outside. In chronic otitis where there is sclerosis, as Dr. Buck has said, the posterior wall of the meatus is bulging and the canal may be so narrow that at times it is scarcely possible to introduce a probe. He does not agree with Dr. Sexton, that the inner opening affords better drainage. When the opening is on the outside, we can insert a tube and cleanse the cavity with a syringe. The operation from the meatus has often been proposed and tried, but has never taken hold of the profession, whereas the opening of the mastoid is more and more acquiring legitimacy.

Dr Sexton does not think he said the operation through the meatus was the easiest. He does not think that we should select the easiest when some other operation is manifestly the best.

Dr. Knapp in concluding the discusion says that he has only a few more remarks to make. He believes that sclerosing mastoiditis is not a rare disease. It will depend upon the gravity of the symptoms as to whether the operation should or should not be performed. He has done this operation *intentionally* only twice. The first was in a case of a young lady who had been incapacitated for work for two years. She had tried almost every form of internal treatment. She had not used, however, sulphide of cal-

cium, so far as he knows. He operated on the mastoid, believing that he would find in congested bone a cavity filled with blood, serum and cell-debris, but he did not expect any suppuration. There was no cavity of any kind. The mastoid process was completely compact. In cutting into the process, the lateral sinus was opened. The dark venous blood welled up, not like the capillary hemorrhage which usually occurs. In this case he intentionally endeavored to get union by the first intention. He asks Dr. Buck if he did not think that was right. The wound was carefully cleaned, closed by the continuous suture, and elastic pressure with absorbent cotton was applied. The patient was kept quiet in bed for three days. The success was perfect. The case was published in the *Arch. of Otol.* two or three years ago.

Dr. Buck admits that under the circumstances the treatment was right. A few sentences from Dr. K.'s paper had escaped him, and for that reason, in making his remark, he prefaced it by saying that perhaps he was wrong in drawing the inference.

Dr. Knapp continues: Also in the next case, the one reported in the paper, some general remedies were tried, but the pain was so severe that after two months it became necessary to operate in order to afford relief. The mastoid process was opened and the result was a complete success.

In regard to the pulsation which he called capillary, but which Dr. Sexton referred to the carotid, there is capillary pulsation in every inflamed part. If a boil is opened and the little cavity filled with water, this will pulsate; so it is in an inflamed middle ear when a small canal is filled with blood or anything to which the pulsation of the capillary vessels can be imparted. As an example we would only mention the pulsating reflex in perforation of the membrana tympani.

LARGE DOSES OF POTASSIUM OR SODIUM IODIDE IN SUDDEN DEAFNESS OF SUPPOSED SYPHILITIC ORIGIN.

By Albert H. Buck, M. D., *New York.*

The following very brief histories of cases are offered as a contribution to the subject of the daily administration — through a period of several days or even weeks — of large doses of potassium or sodium iodide for the relief of sudden or rapidly developed deafness due apparently to the presence of syphilitic lesions in the labyrinth, or in some part of the auditory nerve outside of this system of cavities, or finally, in those parts of the tympanum which constitute the movable barrier of separation between this cavity and those of the labyrinth. I will add that I have been careful not to introduce among these cases any in which easily recognizable inflammatory lesions, presumably of syphilitic nature, were observed in the tympanum, or any in which, from the past history, it seemed probable that any such middle-ear lesions had been present at the time when the deafness developed. I have omitted such cases, because nobody is disposed to doubt the curability of even the very marked deafness when due to syphilitic lesions involving a large part of the tympanic mucous membrane, and interfering with the mechanism of the ossicles.[1] It would, therefore, not be very profitable on the present occasion to report any such cases; particularly as

[1] See the Pathology and Treatment of Venereal Diseases, by Freeman J. Bumstead and Robert W. Taylor. Philadelphia: H. C. Lea. 1879.

my chief object in making this communication is to throw a little light, if I can, upon the prognosis and treatment of what appears to be syphilitic disease of the labyrinth, and at the same time to profit by the experience which other members of the Society may have had in the treatment of such cases, and which this communication, I trust, will lead them to publish. On the other hand, I have not thought it necessary to exclude one or two cases in which evidences of long-standing chronic catarrhal inflammation of the tympanum existed, but in which, at the time of my examination of the ear, no signs of congestion or swelling could be discovered. The profoundness of the deafness and the rapid manner in which it developed in these cases, are, it seems to me, characteristics of syphilitic disease of the auditory nerve rather than of catarrhal lesions in the tympanum.

There is still another point to which I must call attention. In the majority of the instances enumerated below, the grounds for suspecting syphilis to be the cause of the deafness seemed to be amply sufficient, but in a few the evidence in favor of such a conjectural diagnosis was certainly not strong. Indeed, in one case (No. 4), there was no direct evidence that the patient had ever had this disease. His remarkable tolerance of the iodide of potassium (slowly increasing doses until finally 360 grains were taken daily for a period of one week) and the general resemblance of his attack to those of an acknowledged syphilitic nature, are the only grounds on which I can justify myself in placing this case in the same category with the others.

The literature of this particular subject is scanty. The attention of the profession was first called to it in 1877 by Dr. Roosa's report of a remarkable case in which, from a condition of almost total deafness, the patient's hearing within a few weeks was restored to nearly a normal condi-

tion.[1] A second less striking instance is reported by Dr. Roosa on page 526 of the same work. Beside these I can find only two other reports which throw light on the employment of large doses of potassium iodide in the treatment of labyrinthine deafness, presumably of syphilitic origin, viz., those of Dr. Samuel Sexton[2] and Dr. David Webster.[3] In some of these cases, however, it is not frequently clear that middle-ear lesions may not have contributed materially to the deafness.

From the strict standpoint of scientific inquiry it may be objected that no trustworthy deductions can be made from these published cases, or from those which I am about to report, with regard to the effects of the iodides upon syphilitic labyrinthine lesions, inasmuch as in all of them, with a single exception, mercury was administered at the same time. The objection is certainly a valid one; but, as an offset, I will say that, so far as I have any knowledge of the subject, no reports of success in the treatment of this class of cases have ever been published previously to 1877 (Dr. Roosa's report), that is, not till after the iodides had been administered in much larger doses than it had previously been customary to administer. From this circumstance, and from analogous experiences (on the part of others) in the treatment of syphilitic brain lesions, I think that we may properly ascribe to the iodides whatever curative phenomena have been observed in these few cases of sudden deafness.

Case I.—Male; thirty-eight years of age; first seen on October 25, 1880. He began to grow deaf about one year previously. Convulsions occurred at the onset. He was put at this time under ordinary anti-syphilitic treat-

[1] Roosa: Diseases of the Ear, fourth edition, p. 528.
[2] American Journal of Otology, vol. ii., p. 301.
[3] Archives of Otology, vol. xii.

ment. Despite this, however, the hearing steadily and markedly diminished. Patient was very deaf at time of examination, which revealed no lesions adequate to explain the deafness. All that I know about the subsequent history of the case is comprised in the following extract from a letter written by the physician in attendance, Dr. C. McBurney: "Not very long after you saw the patient he developed mania, became very violent, and gave an immense amount of trouble in every way. This mania was doubtless dependent on some syphilitic lesion, and under the very large doses of iodide (several hundred grains daily) the mental disturbance disappeared. The deafness, however, was only slightly relieved."

Case II.—Male; twenty-seven years of age; patient seen for the first time on November 12, 1881. He gave a history of decided naso-pharyngeal catarrh and slowly increasing deafness since the age of fifteen. Eight or nine months ago syphilitic manifestations. Ten or twelve weeks later the deafness, which up to that time had not been very noticeable, became very marked, and at the time of my first examination it was so decided that I could make myself understood only by placing my lips close to the patient's right ear and fairly shouting into it what I had to say. In the left ear the deafness was apparently absolute. In the right ear there were evidences of a former, but now healed, otitis media purulenta (viz., a cicatricial reproduction of a part of the membrana tympani); in the left ear the membrana tympani was simply opaque in appearance and somewhat sunken. There was decided naso-pharyngeal catarrh, with the characteristic tone of voice. Eustachian tubes pervious to air. Hearing not affected by inflations. It not being clear to what extent the recent increase of deafness might be due to the naso-pharyngeal catarrh, I directed treatment toward the relief of this affec-

tion as well as toward the constitutional syphilis. On the one hand, I applied a solution of nitrate of silver (twenty grains to the ounce) to the affected mucous membrane of the naso-pharynx three times a week; and for the anti-syphilitic part of the treatment I recommended daily inunctions of a five per cent. preparation of Squibb's oleate of mercury, and the internal administration of the iodide of potassium, three times daily, in increasing doses.

On December 8th the patient's gums began to be noticeably affected, and the inunctions were accordingly discontinued.

On December 17th he began to complain of great lassitude. He was then taking daily only thirty grains of the iodide of potassium and three grains of the sesqui-carbonate of ammonia. As his face also wore a haggard look, I advised him to stop all treatment for a few days.

On December 27th the iodide of potassium treatment was resumed; the sesqui-carbonate of ammonia being omitted from the mixture. Numerous small ulcers visible on the gums.

December 30th.—Forty-five grains of the iodide of potassium daily. The local applications to the vault of the pharynx were discontinued about this time.

January 4, 1882.—Fifty-five grains daily. An eruption of small pustules has broken out on his face and shoulders.

January 10th.—Complains of a "cold in the head."

January 13th.—Sixty-five grains daily. He complains of headache, a sensation of soreness in the back, sore throat, a very free discharge from the nose, frequent sneezing, and an occasional attack of coughing. A brief suspension of the treatment advised.

January 14th.—Two decided chills with marked prostration occurred during the night. This morning he looks pale and haggard, and complains of a sense of discomfort

in the abdominal region. I prescribed a mixture of the ammonio-citrate of iron and the compound tincture of cinchona, each dose containing two grains of the former and one drachm of the latter.

January 17th.—The iron and cinchona mixture soon produced a decided ringing in his ears, and he discontinued it. All the other unpleasant symptoms, however, have disappeared, and he feels comparatively well again. The hearing, too, of late, has noticeably improved. At times he has been able to understand sentences spoken in an ordinary tone of voice at a distance of four or five feet from his right ear. The improvement, however, has never lasted longer than a few hours, or at most a day, at a time. To-day I am able, sitting directly in front of him, at a distance of two to three feet, to make myself understood by simply raising my voice slightly. He does not appear to read my lips; in fact they are concealed by my moustache.

January 18th.—At the suggestion of Dr. F. R. Sturgis, of this city, who saw the case in consultation with me, I prescribed a saturated solution of the iodide of potassium (1 minim=about one grain). Of this solution the patient was instructed to take fifteen minims three times a day, after his meals, and afterward to increase the dose on the alternate days by five minims. Thus, for example, it was intended that he should take 45 minims a day on January 19th and 20th, 60 minims on the 21st and 22d, 75 minims on the 23d and 24th, and so on.

January 31st.—He is now taking 120 minims daily without any discomfort whatever. Appetite good. A few insignificant pimples are still visible on his face. During the coming week he is to discontinue the iodide of potassium, and in its stead to take daily a drachm and a half of the syrup of the iodide of iron.

February 6th.—Potassium iodide resumed: 120 minims daily.

February 18th.—One hundred and ninety-five minims daily. The papular eruption on the patient's face is now quite noticeable. He is again to discontinue the remedy for one week, and to take the iodide of iron instead. A still further improvement has taken place in the hearing. I can now converse with him at a distance of at least four or five feet; my pitch of voice being as nearly as possible the same as when I tested the hearing on January 17th.

February 24th.—One hundred and ninety-five minims daily.

March 3d.—Two hundred and forty minims daily. No discomfort whatever from the remedy. Hearing distance has increased to seven feet. Iodide of iron substituted for a few days.

March 8th.—Two hundred and forty minims.

March 12th.—Two hundred and seventy minims.

March 13th.—Patient is totally deaf this morning, the result, apparently, of a cold which he contracted last evening. Marked hoarseness. Right Eustachian tube obstructed, and right membrana tympani markedly sunken. Inflations by Politzer's method and naso-pharyngeal treatment to be resumed. The iodide of potassium to be discontinued.

March 20th.—The hearing is again as good as it was on March 3d. Two hundred and seventy minims to be taken to-day.

March 24th.—Three hundred minims.

April 28th.—Three hundred and forty-five minims.

May 15th.—Four hundred and eighty minims.

May 22d.—Five hundred and twenty-five minims.

May 24th.—General malaise. Hearing again quite poor. Numerous small ulcers on gums, on inner surface of lips, and on frenum of tongue. Nitrate of silver (solid) applied to each. The iodide of potassium treatment to be abandoned.

July 6th.—Patient writes from his home in the country that the ulcers have healed, and that his general health is again perfectly good. His hearing, however, remains poor.

The last report which I received was dated September 11th. The ulcers had reappeared on his gums and lips toward the end of July, and he had suffered more or less from "malaria" during this period of nine or ten weeks. At one time the hearing had been even better than it was in New York during the previous month of March. It soon diminished again, however, and was, at the date of his letter, about as bad as when I first saw him.

Case III.—Male; forty-five years of age; February 24, 1882. Deafness began to develop four years previously, and in about two years it had become so marked that it was only with great difficulty that he could hear what was said to him. During the past two years the hearing had remained unchanged. Syphilitic manifestations twenty-five years previously. He had also, up to a comparatively recent date, used alcoholic stimulants to excess. Recently he had had some difficulty with his eyesight, and there had been some paresis of the muscles of the lower extremities.

Treatment (by Dr. E. D. Hudson, Jr., of this city): inunctions with a five per cent. Squibb's oleate of mercury, and increasing doses of the iodide of potassium; beginning with five minims of a saturated solution, to be taken three times daily, and the dose to be increased by five minims on alternate days.

On April 6th his gums began to be affected, and the inunctions were discontinued. Two hundred and eighty-five minims of the iodide of potassium solution taken daily. No eruption. No coryza. No discomfort of any kind.

April 12th.—Three hundred and fifteen minims. No improvement in the hearing.

April 20th.—Potassium iodide discontinued during the past week, but now to be resumed.

May 4th.—He has taken 315 minims daily during the past two weeks, without any unpleasant effects, but also without any appreciable improvement in the condition of the hearing.

Treatment abandoned.

Case IV.—Male; fifty-two years of age: robust health; professional musician (wind instrument): November 2, 1883. Patient had been somewhat hard of hearing since 1877. In the left ear the hearing power had been almost, if not quite, destroyed, but with the right ear he had been able to hear fairly well—well enough for all ordinary purposes of daily life. On October 27th he began to grow quite deaf in the right ear, and in less than forty-eight hours he had entirely lost the hearing in that ear. There was an entire absence of anything like vertigo, but the tinnitus was very marked and extremely distressing. He spoke of it as a terrible rushing sound in his ear. At the time when I saw him (November 2d) I was obliged to communicate with him in writing, as he was apparently perfectly deaf in both ears. Both middle ears and external auditory canals seemed to be essentially normal. No history of syphilis. At first I was disposed to look upon the deafness as due to the rupture of a blood-vessel and the escape of blood into the labyrinth. On this supposition I had three leeches applied immediately to the region of the right tragus, and advised the promotion of free after-bleeding. A blister was also applied behind the ear, and four or five days later a second one was applied to the same spot. No beneficial effects following these measures, I prescribed a saturated solution of the iodide of sodium. Of this he took at first thirty minums daily, and then gradually increased the dose, until, from December

18th to December 24th, he took daily 360 minims. He experienced no unpleasant symptoms from the large doses beyond a scanty eruption on his forehead, and some general malaise toward the end of this period. The hearing, however, was not restored in the slightest degree, and the tinnitus was not appreciably diminished. Treatment then abandoned.

Case V.—Male; forty years of age; apparently in robust health (patient of Drs. George A. Peters and Wm. A. Valentine); May 24, 1884. Two days previously he had experienced decided vertigo, nausea, and double tinnitus. In a short time vomiting of mucus and bile set in, and continued, at intervals, for several hours. He then made the discovery that he had entirely lost the hearing power of both ears. Examination of the ears revealed no lesions other than those of a chronic catarrhal inflammation of both tympana. He declared that he could hear the ticking of my watch in his right ear, but he was not able to distinguish spoken words.

As the patient had been under my care ten years previously for syphilitic sore throat with subacute otitis media, I advised a trial of the mixed treatment described above.

May 28th.—The vertigo has largely disappeared, and patient says he can understand what his wife says to him in a loud, shrill voice.

On July 7th I learned from Dr. Valentine that little or no improvement had taken place in the hearing, that tinnitus was still marked, and that he could not as yet walk steadily. Up to that time he had not been able to take more than 90 grains of the iodide of potassium daily. It was found that he could take this more comfortably than he could the iodide of sodium, which nauseated him.

July 14th.—Patient has been taking 180 grains daily, but without any effect upon the hearing. On the 11th the

treatment was suspended, as patient's stomach began to rebel.

Soon afterward the treatment was resumed, and before the end of the month the daily quantity of potassium iodide taken by the patient had reached 270 grains. He had taken this quantity daily for a period of one week, when it was found necessary to stop the treatment altogether, as his general condition showed that it was doing him more harm than good. It certainly produced little or no effect upon the hearing power, as it was still found necessary to communicate with him in writing.

It is not possible to draw any very satisfactory conclusions from such a small number of cases. For example, the treatment failed to accomplish anything worthy the name of improvement in any of these five cases, and yet, as has been observed in the cases reported by Dr. Roosa, and in those reported by Dr. Webster, essentially the same treatment may accomplish strikingly favorable results. I have compared these cases very carefully with those reported above, in the hope that I might find out certain distinguishing features which would enable us to divide all such cases into classes, viz., those which might be benefited by treatment, and those in which treatment would almost certainly fail. I have not, however, been able to find any such distinguishing characteristics. The only plausible explanation that I can give of the infrequency of our successes is this: A syphilitic gumma in the labyrinth, and especially in the cochlea, will rarely fail to produce damage from which recovery is scarcely possible. Treatment may lead to the absorption of the gumma, but it cannot readjust and render functionally useful those delicate and carefully adjusted organs which the tumor has disarranged, and perhaps even destroyed. In the brain excellent compensatory provision seems to have been made for the pres-

sure caused by a gumma or other morbid growth; in the labyrinth, on the other hand, the rigidity of the surrounding walls, and the paucity as well as smallness of the blood-vessels, almost preclude the possibility of compensation. On physiological grounds, therefore, I feel confident that such cures as those reported by Dr. Roosa and Dr. Webster will always be exceptional. In these cases we may assume that the pressure had gone only so far as to suspend for a time the vibratory power of the cochlear structures, but had not destroyed or even seriously disarranged them. It is also possible that the gumma may occupy a position in the vicinity of the oval window and foot-plate of the stirrup, or in that of the secondary tympanic membrane. A lesion so situated would be competent to annul the power of hearing, but it would not necessarily destroy it.

In the next place, it will be observed that in the favorable cases the improvement began to show itself as early as during the second or third week of the iodide of potassium treatment. This would suggest the question whether it is really necessary to push the doses to the extreme limits recorded above (viz., 270 gr., 315 gr., 360 gr., 525 gr., and "several hundred grains" daily). This is a question which cannot be satisfactorily answered until we shall have accumulated a greater array of evidence. I am disposed, however, to adopt for the present the rule of not giving more than from one to two drachms daily in those cases in which commencing improvement is observed during the second or third week of treatment.

In conclusion, I will state that in the first years of practice I must have registered some cases of syphilitic disease of the labyrinth as instances of "Ménière's disease," and I believe that this error—if error it be—has probably been committed by other specialists.

DISCUSSION.

Dr. Jones makes the inquiry, what Dr. Buck means by total deafness?

Dr. Buck says he means deafness as regards the perception of ordinary sounds.

Dr. Jones asks if he did not refer to bone conduction?

Dr. Buck answers that he tested these patients with the tuning-fork, but the results were so unsatisfactory, and it was so difficult to separate the simple sensation of vibrations from that of sound that he decided to make no note in regard to it.

Dr. Jones understands Dr. Buck then to use the expression in the sense of very marked impairment of hearing, so marked that the person was practically deaf; there being at the same time the possibility of sound conduction.

Dr. Pooley says that a conversation which he had with Dr. Buck induced him to look over his note books, and he found that he had had a few cases of this kind, five or six in number. He has the records of only one case which was materially improved by treatment. In this case the patient had been treated for the disease three or four years previously. He came under treatment in the winter for hardness of hearing on one side. On the other the hearing was normal. There were no evidences of inflammation of the middle ear on either side. On the affected side he was apparently deaf to all ordinary sounds. He could not hear shouting in the ear. He did not recollect whether the tuning fork was tried or not. He gave him iodide of potassium in combination with biniodide of mercury, the ordinary mixed treatment. He thinks that the maximum dose was ten grains three times a day. He expressed an unfavorable prognosis. He did not see him again for from four to six weeks, during which time he continued the medicine. He then stated that the hearing

was improved. Examination showed that he could not hear the ticking of the watch, but he could hear the voice at four or five feet. He has not seen him since. This embraces his experience in the treatment of these cases in private practice.

There is one other thing which he wishes to say about the treatment of this class of cases with iodide of potassium. A number of years ago a patient came to him perfectly deaf from supposed syphilitic disease. He gave large doses of iodide of potassium, as large as some recorded by Dr. Buck, with the effect of producing an intense form of acute angina and inflammation of both middle ears, which caused perforation of both drumheads. This condition seemed to him to have been produced chiefly by large dose of the medicine.

Dr. Jones thinks it might be due to exposure to cold while under the influence of the iodide.

Dr. Knapp says he has met with two cases of total loss of hearing from syphilis, lately. In one, the patient came to him five or six months after becoming deaf. Anti-syphilitic treatment had been instituted. He treated that man in the hospital for five or six months with as much mercury and iodide of potassium as he could stand, more than a drachm of iodide being given four times a day. The result was completely negative. There was no perforation and no suppuration. He watched him for two years, but there never was any improvement.

The other case occurred within the last year. The patient came to the hospital in the second or third week after deafness had set in. The deafness was sudden, occurring within from one to three days, during the presence of secondary symptoms. He treated him with mercury and iodide of potassium and watched him for six months, but not a trace of hearing for any source of sound was restored. There was no perforation or suppuration.

He has treated a number of such cases where the deafness was not complete. They yielded to treatment. Mercury was given by hypodermic injections in doses increasing from $\frac{1}{16}$ to $\frac{1}{5}$ of a grain daily.

Dr. Sexton would call attention to some cases of sudden deafness due to syphilis, which he treated with large doses of iodide of potassium and mercury, and which were reported in the second volume of the American Journal of Otology. Since that time he has seen a large number of cases of this kind, and has been induced to observe them more closely than before. Some of the cases resemble in their gravity and persistent deafness, that which is consequent on cerebro-spinal meningitis. They seem to be entirely unrelieved by any form of treatment.

With regard to Dr. Buck's inquiry concerning the advantage of large doses of iodide of potassium, he would say that in the cases which he reported he pushed the iodide to the extreme of toleration. He would say in regard to toleration that he has observed in hospital cases that the toleration depends to a large extent on the mode of administration. If the iodide was largely diluted and given in sufficiently separated doses, a greater quantity could be taken than if it were given in smaller quantities of water. The medicine is, he thinks, sometimes pushed too far. If this is done, we run a risk of injuring the kidneys, which should be watched closely. He does not give mercury in as large doses as he did at first. He uses the bichloride internally and inunctions externally. He should say from his experience that in the more severe cases, no benefit is derived from treatment, and in the cases amenable to treatment it is not necessary to give large doses to obtain a satisfactory result. Three to five grains of iodide of potassium and one-thirtieth or one-fortieth of a grain of the bichloride of mercury given three or four times daily with inunctions, if necessary, should be sufficient. In

regard to ptyalism, he thinks that it can be controlled by proper attention to the teeth, by careful cleansing and having carious teeth and tartar removed. Most cases of ptyalism have occurred where the teeth were very bad.

Dr. Kipp states that he does not know that it is exactly germane to the subject to speak of the deafness of hereditary syphilis. He has treated a considerable number of such cases. He has found that when local measures did not give relief to the ear disease, the iodide of potassium was also of no benefit. He formerly believed that in these cases the deafness was always caused by labyrinthine disease, but during the last few years he has seen a number of cases, in which the disease was undoubtedly seated in the middle ear, and in these the deafness was relieved by the ordinary treatment for catarrhal disease of the middle ear. In cases in which there were no signs of middle-ear disease he has given the iodide of potassium in large doses, without any effect on the ear trouble. He does not think that acquired syphilis often produces deafness.

Dr. Jones thinks that Dr. Buck's inquiry was more particularly in regard to iodide of potassium.

Dr. Buck answers in the affirmative. He wishes to know whether his experience is the common one, and what is the proper conclusion to draw, or indeed if it is proper to draw any conclusion from so few cases.

He must say that Dr. Sexton has expressed the conclusion which he has been tempted to draw, viz.: that if improvement does not take place after a reasonable time with a moderate dose of the iodide, it is not to be expected under a larger dose. The thing which led him to carry out this excessive iodide treatment was this: In talking with a gentleman, he told him of a case of paralysis, in which the lesion was supposed to be cerebral. No improvement occurred until four or five hundred grains of the salt were given. The patient was kept on this dose

for a long time, and got rid of a considerable portion of his paralysis. He said that in order to get successful results the medicine must be pushed to a high point.

Dr. Jones believes that in those cases in which beneficial results have followed, it is difficult to determine how much benefit has followed the iodide of potassium or other medicines, especially mercury.

Dr. Buck says that mercury was used only at the beginning. As soon as the gums were touched, it was abandoned.

Dr. Knapp had treated a gentleman, two years ago, who had syphilis for a long time. He also had chronic middle ear disease which exacerbated every now and then. He was treated with external applications and small doses of iodide of potassium and mercury. There was no decided improvement. One winter, he got worse and suffered from complete hemiplegia. Dr. K. sent him to Dr. Loomis, who treated him with large doses of iodide of potassium, over one ounce a day. The patient recovered from his hemiplegia promptly and the ear disease was improved. He has not had much syphilitic manifestation since that time. The ear is moderately good. The improvement has to be attributed to the administration of large doses of iodide of potassium.

Dr. A. Mathewson, Brooklyn, N. Y., states that in a case which he had, although the iodide was pushed and continued for a long time, the result was negative. In regard to iodide of potassium in cases of ocular paralysis, in a case which he treated, giving twenty grain doses, he obtained no benefit, but running the dose up to a drachm, there was decided improvement. Another case was also treated with small doses of iodide of potassium and mercurials without any result, but dropping the mercurial and pushing the iodide, he obtained satisfactory results.

Dr. Sexton thinks that with regard to the question of

dose, a further remark might be worth making. In a case which he saw with Dr. Bumstead, large doses of the iodide with mercury were given. Since then his faith has been somewhat shaken and he is now of the opinion that in those cases in which large doses are reported as having been successful, the disease would have yielded to smaller doses.

Dr. Andrews presumes that the good results are obtained in the treatment of recent cases. He has treated a case of bilateral optic neuritis, with hemiplegia, (syphilitic), and violent suicidal headache, if he may use the term, which recovered entirely under iodide of potassium, the maximum dose being two drachms in the 24 hours. In total deafness in chronic cases, he has used iodide of potassium, never exceeding one ounce a day, but has never seen any benefit. These were, however, cases in which deafness had existed for a long time.

Dr. Sexton says that Dr. Jones has brought up the point as to what is meant by total deafness. He supposes there is no such thing as total deafness, as long as there is perception of vibration.

Dr. Knapp asks Dr. Sexton if he does not believe in the possibility of total blindness? The auditory nerves may be destroyed, as well as the optic nerves. It is not a question of perception of vibration. There may be vibration of the body without hearing.

Dr. Sexton has seen patients recovering from cerebrospinal meningitis who could not hear anything said to them, and yet could hear the ringing of a bell. Without the perception of the vibrations hearing cannot exist.

Dr. Knapp begs leave to give a personal illustration. In listening to music he has sometimes felt in his abdomen a sort of vibration to certain sounds of the trumpet. No sensation of sound was connected with it, but a distinct vibration of the gut occurred at certain notes of the trumpet. It was only felt in a certain region of the abdomen,

which must have been tuned to a certain trumpet tone. The feeling of vibration by sensitive nerves in any part of the body is not audition. Audition requires the function of a nerve of special sense, the acoustic.

DISEASE OF THE ETHMOID, THE CONSEQUENCE OF CHRONIC CATARRH OF THE NASO-PHARYNX. EXOPHTHALMOS.

By J. J. B. Vermyne, M. D., *New Bedford, Mass.*

In the April number of the Archives of Otology of this year Dr. Knapp publishes a case of Ivory Exostosis of the Ethmoid Cells, and prefaces his subject with the remark that the case might with propriety be reported in an ophthalmological or a general medical journal. Considering, however, the importance of naso-pharyngeal catarrh as a factor in the production of ear-diseases, he believed it would not be out of place in the Archives of Otology. In the case which I wish to report, displacement of the eyeball from encroachment on the orbit was the prominent symptom, as in Dr. Knapp's case—it came to me as a case of eye-disease—but as the disease evidently was the consequence of chronic catarrh of the naso-pharynx, I beg leave to follow Dr. K.'s example, when bringing the case before this Society, rather than before the Ophthalmological Society. The treatment of the naso-pharynx falls so largely in the hands of otologists, after the hearing power has been affected, that any disease of that cavity must be of interest to those who give special attention to diseases of the ear.

Miss C. S., aged 16, a healthy looking young lady, came to consult me a little over a year ago, at the advice of her family physician, for a protrusion of the right eye, which had been observed for some time. For a few days previous there had been slight headache—she had been

somewhat ailing—but no serious disease had attacked her since her fifth year, when she had a very severe attack of scarlet fever. Since that time she has suffered from chronic catarrh of the naso-pharynx, especially from the right side, with constant muco-purulent or purulent discharge. The right eye is distinctly pushed forward, and slightly outward.

The eyelids are normal, close normally over the bulbus; no dilated veins can be observed. Conjunctiva and externally visible parts of the eye appear normal. There is complete absence of pain in and around the eye; the vision is not disturbed, neither are the movements of the eye interfered with. Vision O. S.=1, E.; O. D.=1, slightly improved by +0.5 D. The ophthalmoscopic examination showed the disc slightly raised and the vessels somewhat distended. No pulsation or murmur can be detected by placing the stethoscope over the eyeball.

My first impression was the forming of some neoplasma within the muscle-cone, producing pressure against the globe, and thereby the protrusion and the ophthalmoscopic appearance. Consequently I prescribed Potass. Bromid. and Hydriod. internally, and Potass. Hydriod. with Iodine externally, and advised slight pressure upon the bulbus. My fears of important affection in or around the n. opticus were increased at the occasion of my second visit, when she had a slight fainting spell. But with this exception she never had any nervous disturbance. The headache, of which she complained at the occasion of her first visit, very soon left her, and with the exception of the slight deformity from the protruding eye, she felt well.

The absence of pain and of general symptoms and the unobstructed vision first led me to the supposition that some other cause might exist for the exophthalmos, than the one I had at first assumed, nl. growth behind the bulbus. Making a careful digital examination I found a tumor, the

size of half a hazelnut, extending from the upper inner edge of the orbit to a little below the ligamentum canthi internum, gradually sloping backward as far as the finger could reach. It was of bony hardness, slightly uneven, not painful to the touch, immovable and connected with the os planum or the lamina papyracea of the ethmoid bone. The lachrymal canals and ducts were patent. It occurred to me that the chronic catarrh of the naso-pharynx was the cause of the present condition. In examining the nasal cavity I found that the patient breathed quite freely through both sides, and as far as could be discovered, no polypi existed. There is, however, abundant muco-purulent discharge, especially from the right side.

The mother of the patient told me at this time, that on different occasions previously, she had observed a peculiar appearance of the right eye, which was generally called a "lobster eye." This would last for several days and then apparently recede. Whether this peculiar appearance ever coincided with an increase of the catarrhal affection, I could not learn. I now changed the treatment, increasing the dose of Potass. Hydriod, internally, omitting the Bromide and advising the use of Potass. Hydriod. with Tinct. Iod. (v. Tröltsch formula) in the nasal cavity, tonics and especially out-door exercise of any kind. Under this treatment the catarrhal trouble has diminished. It was occasionally supplemented by the use of a four per cent. solution of boracic acid, when the discharge became purulent and this is now very rarely the case. The general health has improved, and beyond the deformity, caused by the slight protrusion, there is no complaint. The patient afterward admitted that for a long time she had observed slight diplopia, on opening her eyes in the morning, but which would disappear in a few seconds. Being so slight, it had almost entirely escaped her attention. It still continues, but is not increased. She thinks the eye is less prominent.

Whether this be so or not, I am not able to determine with the necessary degree of accuracy.

The rarity of cases of this kind is a sufficient reason for their publication. Berlin, in Graefe-Saemisch Handbook, 6th vol., 2d part, gives the statistics with regard to diseases of the orbit from 209,185 cases of eye disease, collected from the yearly reports of 65 Institutions. The percentage of diseases of the orbit is 0.19%. Of these diseases nearly one-half were pure orbital tumors, while 2.7% were tumors originating in neighboring cavities, the maxillary, ethmoid, or cranial cavity. But aside from its rarity, the case seems to me to present some special points of interest with regard to diagnosis and treatment.

Although tumors originating in neighboring cavities and gradually encroaching upon the orbit may often be mistaken for pure orbital tumors, there is no difficulty in locating the tumor in the present case as originating from the ethmoid bone. From its form, the absence of pain and the general good health of the patient, I believe the diagnosis must lie between exostosis and retention tumor. A case of the latter kind was reported by Dr. Knapp, before the International Ophthalmological Congress in New York, 1876, which I beg leave to repeat here;

"A healthy looking girl of 14 years of age consulted me in March, 1874. A tumor the size of a walnut, occupied the region of the inner, upper corner of the orbit, reaching downward a little below the ligamentum canthi internum. Its entire surface felt hard like bone, and was nodular. The tumor was entirely immovable, caused neither pain nor inflammation, but pushed the eye outward and a little downward without impairing the vision. She breathed through the left nostril without obstacle and her voice had no nasal twang. The tumor had first been noticed three years previously, as a slight swelling, above the inner corner of the eye, had grown slowly at first, more rapidly

the last months, but had never been connected with pain, weakness of sight or any other inconvenience. The disfigurement and the beginning protrusion of the eye caused her to seek relief."

The case I have reported has so many features in common with Dr. Knapp's case, that I feel inclined to the belief that the tumor in question is a retention tumor. Puncture with a trocar would certainly be the most accurate manner to ascertain the nature of the tumor, but unless some positive advantage could be gained by the use of any instrument, would not be readily assented to. But my opinion is based especially upon the existence of chronic catarrh of the naso-pharynx, more prominent on the right side, and upon the occasional appearance of the "lobster eye," mentioned above. I referred the case with a history to Dr. H. W. Williams of Boston, who entirely confirmed my view of the case.

Dr. Knapp, considering his case one of exotosis, proceeded to its removal by chisel and hammer, when it proved to be a thin, bony shell, the distended os planum, and the recesses of the ethmoid filled with a stringy mucopus. This operative proceeding is recommended by him, even to the point of disregarding the explorative puncture of the tumor advised by other writers, as the nature of the tumor will show itself during the process of operation for its removal. But from a recent case, reported by Dr. Knapp in the Archives of Otology, April number of this year, alluded to at the commencement of this paper, we may draw some valuable lessons. Dr. Knapp himself formulates them under 3 and 4 of his conclusions.

3. Osseous tumors, which develop in comparatively healthy pneumatic cavities, can be removed with safety.—That is to say, the operative traumatism does not constitute an element of particular danger.

4. The removal of osseous tumors from pneumatic

cavities with diseased osseous walls, is dangerous by causing the inflammation to extend into the cranial cavity, and often proves fatal by acute (traumatic) meningitis and encephalitis.

In this case there was a tumor of bony hardness, the size of a cherry, on the nasal side of the left orbit, immovably connected with the os planum, which was noticed four months previously and had steadily increased to its present size. The eye was slightly displaced, but otherwise not affected. There were then, and there had been for some time, polypous growths in the nasal cavity, which had often been removed. His opinion was that the orbital tumor was either an expansion of the ethmoid cells by the polypous growths or a more or less solid osteoma, springing from the walls of these cells. The tumor was removed, and on the fourth day the patient died.

At the autopsy it was found, that the chronic inflammation of the pneumatic cavities of the upper part of the face had led to a distension of the left frontal sinus and rendered its osseous walls congested and porous (ostitis) with beginning necrosis. The enucleation of the growth, the opening of the frontal sinus and the scraping out of its contents with a sharp spoon, had produced sufficient irritation in the diseased walls of the sinus to incite a purulent meningitis, which became the immediate cause of death.

I have failed to find in the description of this case any indication which might lead us to assume, during life, that there existed the morbid condition of the osseous walls, which led to such a fatal issue. It would certainly not have escaped the attention of such an accurate observer. The question becomes pertinent: What constitutes a *comparatively* healthy pneumatic cavity, and cannot in cases of this kind some participation of the osseous walls near the growth always be suspected? Since Knapp advises, in his first article, the same treatment, both for exos-

tosis and retention tumor, nl. the removal by chisel and hammer, the danger that we might meet with such an experience as he had, cannot be considered too lightly. It may be that there is less danger of such complication when the osseous walls are only mechanically distended, but in this case the preliminary investigation of the nature of the tumor with trocar, in place of being unnecessary, would become imperative. In both of Knapp's cases, the character of the growth was only ascertained *after* the operation. It is certainly not justifiable to operate in such cases without duly considering all circumstances.

Dr. H. W. Williams (Diseases of the Eye, p. 409) says that if osseous tumors are of slow growth and not inconvenient size, they may be left untouched.

Schweigger (Handbuch der speciellen Augenheilkunde, p. 199.) says: Osseous tumors of the wall of the orbit may appear from every part of the walls, but more especially from the upper and inner wall. Frequently these tumors are connected with disease (polypi or granulations) in the nasal cavity or the frontal sinus or extend into the cranial cavity. He recommends the Potass. Hydriod. With regard to resection he says: It does not give any average of favorable results, which can easily be explained from the uncertainty of diagnosis with regard to the extension of the tumors and their situation in the orbit.

R. Berlin (Graefe-Saemisch Handb. d. Augenh, VI. 2, p. 730) says that of the cases of resection or extirpation of osseous tumors 25 % die from meningitis or encephalitis, and that the deformity can in no case justify a proceeding, which gives such a high percentage of unfavorable results. He modifies this statement somewhat by saying that if the upper wall of the orbit is not included in the growth, resection of the tumor may be advisable, "if it become necessary to save the eye."

Although in my present case, an increase in the growth,

endangering the functions of the eye, or the eye itself, or excessive pain might call for more determined surgical interference at some future time, I believe I am justified in continuing the treatment which has been followed thus far.

DISCUSSION.

Dr. Knapp remarks that a great many of these cases are due to nasal polypi.

Dr. Vermyne states that he examined the nasal cavity as carefully as possible, but could not discover any polypi, although he suspected their presence.

Dr. Knapp says that such a case came to him a year ago, in which there was a tumor in the frontal sinus protruding at the inner angle of the eye. It was soft. After removal it was found to be a polypus of the frontal sinus. It showed some similarity to sarcoma. A month ago the patient presented himself again with the naso-pharynx filled with polypoid growths which Dr. Brandeis removed with the galvano cautery. Polypi may be large and single, or small and numerous; protruding conspicuously into the nasal passages, or hiding in inaccessible recesses of the ethmoid labyrinth. It is also stated in an admirable pamphlet on the subject by Ollivier that polypoid growths are frequently the origin of osteoma and retention cysts.

Dr. Kipp states that he intends to report two cases of this kind at the meeting of the American Ophthalmological Society. The first case was that of a man, 54 years of age. For many years before he consulted him, he had suffered from frontal headache, but had otherwise always enjoyed good health. A year ago he first noticed that he saw every thing double. Since then the left eye has gradually become more prominent. On examination this eye was found to be pushed downward, outward and slightly forward. The mobility of the eye was decidedly impaired

upward and inward. Palpation discovered an irregular, nodular tumor which was adherent to the upper half of the inner orbital wall, nearly the whole of the upper wall, and projected about half an inch towards the eye. The tumor extended in the orbit as far as the finger could reach, and felt hard and unyielding to the touch. No fluctuation could be discovered. No pulsation. The tumor was supposed to be a sarcoma connected with the periosteum and its removal attempted. While examining the growth with the finger, after it had been exposed by an incision, the wall of the tumor was felt to give way and a few moments later a large quantity of pus escaped from the opening; at the same time a considerable quantity of pus came from the nose. The opening was enlarged and a drainage tube introduced. The exophthalmos gradually disappeared and every thing went on well until the eleventh day after the operation, when pneumonia developed which rapidly caused death. The autopsy showed that the pneumonia was lobar, not pyæmic. The examination of the head showed that the frontal sinus, the ethmoidal cells, and the sphenoidal sinus of the left side constituted one immense cavity which was filled with pus. Spiculæ of bone projected everywhere from the bony walls of the cavity. The roof of the sinus was of a dark color and carious.

In the second case, that of a woman, 57 years of age, she had suffered for many years from frontal headache. Six months before he first saw her a swelling was noticed at the inner upper angle of the orbit; since then it has steadily increased in size. No injury to this part had preceded the appearance of the swelling, but she had always been afflicted with naso-pharyngeal catarrh. He found the tumor to be about the size of a hickory nut. It was immovably attached to the inner upper angle of the orbit and extended into the orbit as far as the finger could reach. The surface of the anterior part of the swelling was smooth

but the posterior portion nodular. It was quite hard, but on deep pressure fluctuation could be felt. The skin over the tumor was healthy and not adherent to the growth. The eyeball was pushed slightly downward and outward, and the movement upward and inward was somewhat impeded. The eyeball was healthy. With the exception of great swelling and congestion of the mucous membrane nothing abnormal could be discovered in the nose. The patient declined operative interference. Nine months later the swelling was somewhat larger, and there was now ulceration of the cornea. One day while pressing on the tumor it was felt to diminish in size and at the same time the patient expectorated exceedingly offensive matter. Shortly afterwards very offensive pus flowed also from the nose. From this time on applications were made to the mucous membrane of the nose, and the nose was frequently washed out with warm salt water. The patient was instructed to prevent distension of the sac by emptying it whenever it was found to contain fluid. For some weeks the cyst refilled very quickly, and at one time an inflammation of the skin over the tumor was developed, which spread also over the right half of the forehead. Under the application of ice-compresses these subsided very quickly. For some months the patient was free from all pain and the cyst became distended but rarely, and the discharge was no longer offensive. Then she had suddenly a severe chill, followed by heat and perspiration, without marked change in the condition of the frontal bone. The ophthalmoscope showed indistinctness of outline of optic papilla, but no other abnormity. Quinine was given, and there was no return of the fever. Since then the patient has been in good health. The tumor has not reappeared for many weeks and the optic disk is again entirely normal. The skin over the inner upper margin of the orbit is somewhat thickened, but otherwise normal. The defect in

orbital wall is about the size of a ten-cent piece and its margin is markedly nodular, several of the nodules being about the size of a pea. The end of a finger can almost be pushed through this hole into the frontal sinus. The mucous membrane of the nose is still swollen, although the swelling is much less than it was six months ago. Now it is not an uncommon occurrence for air to find an entrance into the frontal sinus, when she blows her nose.

REFLEX AURAL PHENOMENA FROM NASO-PHARYNGEAL CATARRH; OBJECTIVE NOISES IN AND FROM THE EAR.

By Charles H. Burnett, M. D., *of Philadelphia.*

It has been known for some time that irritation in the nares, especially at the posterior parts, in the erectile tissue, would excite a spasmodic cough.[1] It has of late seemed very plain to me, that certain aural phenomena, such as objective noises in and from the ear, could be explained in a similar way. The irritation in the nares and nasopharynx in these cases may be reflected to the muscular tissues of the velum palati, the fibres of the superior constrictor of the pharynx, and to the pterygoid muscles, producing clonic spasms, which in turn produce snapping sounds, audible at greater or less distances from the patients. Thus, in the case of a Japanese officer, reported on page 443 of the first edition of my "Treatise on the Ear," an objective noise in the right ear was audible several feet from the patient, the nasopharynx and the pharynx were catarrhal, the opposite ear was affected with chronic purulent disease, and the ear from which the noise emanated had been the seat of an otorrhœa a year previous, and finally, while under my observation, manifested symptoms of acute catarrh, the membrana tympani opened spontaneously, and mucus was discharged from it. Upon amelioration of the catarrhal disease in this case, the ob-

[1] John N. Mackenzie, M. D., of Baltimore: American Journal of Medical Sciences, July, 1883.

jective noises ceased. In this instance there was a marked spasm of the right half of the velum with the occurrence of each objective snapping sound in the ear. Spasms in the velum are the most usual visible manifestations in the muscular tissues near the ear, and have been noted by other observers in cases of similar objective aural noises.

Recently I have observed two other cases of objective aural noises, both of which were evidently connected with catarrhal disease in the nares and nasopharynx.

The first case was that of a young physician twenty-eight years old, who consulted me on October 5, 1883. He stated that for twenty months he had felt a "clicking" in his left ear, produced by both objective and subjective sounds, as, for example, the clicking of a card in the fingers, or the blowing of a shrill toy whistle near his ear, or by his own coughing, speaking, or singing. It was found that when he said m, n, or o rather loudly, but with no other vowel sound, this "clicking" in his ear was produced. I thought I could detect a slight change in the pyramid of light, *i. e.*, a slight motion of the membrana tympani, when he produced the "clicking" in the ear by uttering these consonant and the vowel sounds; I also faintly heard, by means of the auscultation-tube the "clicking" in his ear, when he produced it as above described. There was no difference in this sound, when induced by subjective or objective causes; it was more likely to be produced at night or the end of the day when fatigued, than in the early part of the day. Up to this time it had never occurred automatically, *i. e.*, without an objective or subjecto-objective excitant. Subsequently, when the patient was run down by the winter's work, this "clicking sound" did occur automatically, when he was entirely quiet.

The membrana tympani displayed a good lustre, and the pyramid of light was fair; the membrane was retracted, and the incus was visible. The membrane moved fairly

under the pneumatic speculum. The right membrane manifested an identical condition. The Eustachian tubes were entirely pervious to inflations; the anterior and posterior nares were hypertrophic, the left markedly more so than the right; the pharynx was red, and manifested tobacco smokers' pharyngitis. The patient had smoked cigarettes to excess, but had not done so recently.

There was at no time any discernible muscular spasm in any part of the pharynx, nor velum palati, nor was the patient conscious of any spasmodic motion or twitching in any part of the naso-pharyngo-aural tract.

Treatment. The anterior, hypertrophied portions of both inferior turbinated bones were touched several times with Lugol's solution of iodine. Upon one occasion this mixture was pushed along the left inferior turbinated bone to the posterior pharyngeal wall. This caused pain and brought on an attack of the "clicking" in the left ear. The pain and the "clicking" were quickly allayed, however, by spraying the nostrils with fluid cosmoline (Petroleol). In a short time, *i. e.*, after four or five applications of the iodine to the inferior turbinated bones, and the use of the cosmoline spray, the hypertrophy became much less, and the noise in the ear occurred less readily and not so frequently. The patient then dropped all treatment until last spring, when the "clicking" became very annoying, occurring easily when the patient was exposed to noises, or when he sang, talked, or whistled. Finally the noise occurred automatically even when the patient and his surroundings were perfectly quiet. The patient was somewhat debilitated, and, about this time, after running up stairs one evening after supper, fainted upon reaching his room.

The nasal hypertrophies, both anterior and posterior, especially on the left side, seemed larger, and the nasal catarrh generally worse. Iodine and glycerine, equal

parts, were applied to the hypertrophies, the nares were sprayed with Dobell's solution, and once the hypertrophied tissues at the back of the septum on the left side, were cauterized by means of the galvanic wire-cautery. This treatment produced very good results, the "clicking" practically ceased to annoy, as it occurred very rarely, and only very faintly. The improvement has been maintained to the present time.

Etiology.—There was in this case an undoubted spasmodic action in muscular tissue near the Eustachian tube, but entirely invisible to the examiner, and not felt by the patient. The muscular spasm in this case was probably located in the upper fibres of the superior constrictor of the pharynx. This muscle arises from the lower third of the margin of the internal pterygoid plate, and its hamular process, from the contiguous portions of the palate bone, and the reflected tendon of the tensor palati muscle, from the pterygo-maxillary ligament, from the alveolar process above the posterior extremity of the mylo-hyoid ridge, and by a few fibres from the side of the tongue in connection with the genio-hyoglossus. Its superior fibres of insertion arch beneath the levator palati and the Eustachian tube.

The mucous membrane of this muscular tract was, as has been stated, markedly catarrhal, the inferior turbinated bones and the nares were hypertrophied, and the fauces were affected by smokers' pharyngitis. In these conditions in the mucous membrane, there is found sufficient cause of irritation of the sensitive nerves in these parts; this irritation is reflected to the underlying muscular structures through motor nerves, and there ensue spasmodic twitchings near the Eustachian tube, which are perceived as subjective and objective noises. That the origin of these "clickings" lay in the catarrhal condition of the upper pharynx and the nares is freely shown by the cessation

of noises, upon the amelioration of the catarrhal symptoms.

The easy excitation of the spasms by talking is explained by the fact that a few fibres of origin of the superior constrictor of the pharynx arise from the genio-hyo-glossus, and hence lingual motions would tend to excite the aforesaid sounds in the ear. It may also depend upon the motions of the jaw, as the constrictor has a partial origin from the posterior part of the alveolar process, and upon the movements of the buccinator. which has a common origin with the superior constrictor of the pharynx, in the pterygo-maxillary ligament. The annoying audibility of these muscular spasms is due to the insertion of the superior constrictor near the Eustachian tube.

Another case, of objective snapping noises in the ear, came under my observation within a short time, and is now under treatment.

Miss McG., aged twenty years, stated on June 2, 1884, that about six months previous she had first noticed a clicking sound in her right ear, and that her family noticed that they too, could hear it. She is not disturbed by the noise at night, though it appears to be almost ceaseless. Its occurrence is paroxysmal, with short intervals. It is heard objectively quite as well, perhaps better, at the nostrils than at the meatus of the right ear. It is very well heard at the latter point by means of the ear-trumpet. The number of clicks is about eighteen to twenty per minute. With each clicking sound the lower maxilla is both felt and seen to move, chiefly toward the right side; the latter symptom is very annoying to the patient. A manometric column attached to the right ear, rises and falls with each click, due very probably, however, to the motion of the lower maxilla, and not to movements in the membrana tympani.

The patient stated that she had of late begun to hear

the noise in the left ear. Objectively it is not very pronounced on this side. It can be heard, however, at this point. Pressure upon the muscles over the carotid on the right side, behind the angle of the jaw, arrests the motion of the latter, and the objective noise. Opening the mouth very widely, stops the noise almost entirely, only a faint click being heard now and then.

The patient is a pale blonde, somewhat neurasthenic; the right membrana tympani is opaque and retracted, and on this side the hearing is reduced to a few inches. The nares, nasopharynx, and fauces are catarrhal, and she feels often the dropping of mucus from her nasopharynx into the throat. Her spirits are not depressed by these peculiar aural phenomena, and she sleeps well. The motion of the lower maxilla, observed in this case, in connection with each clicking sound, is due to a clonic spasm of the pterygoid muscles of both sides; but chiefly of the left side, as denoted in the greater tendency of the maxilla to move towards the opposite side, *i. e.*, toward the right, since when the external pterygoid muscle of one side acts either alone, or chiefly, the corresponding side of the jaw remains fixed, and the symphysis deviates to the opposite side.

The distinct, objective audibility of the spasms at the nares and auditory meatus is due to the fact that the internal pterygoid arises from the pterygoid fossa, its fibres being attached to the inner surface of the external pterygoid plate, and to the grooved surface of the tuberosity of the palate bone. Its internal surface is in close relation to the tensor palati, while the external pterygoid arises from the pterygoid ridge on the wing of the sphenoid, and the portion of the bone included between it and the base of the pterygoid process; from the outer surface of the external pterygoid plate, and from the tuberosity of the palate and superior maxillary bones. Hence any vibration occurring

in the muscular structures near these points of origin would be easily communicated by the Eustachian tube, to the tympanic cavity and the external ear, and also directly through the nares to the external air. So that a snapping sound occurring in the region of these muscles would be at once a subjective and an objective noise in and from the nasopharynx and ear, rendered more audible by resonance of the nasopharyngeal space and of the nares. These sounds may have been augmented by a simultaneous spasm in the fibres of the superior constrictor of the pharynx, which has a small tract of insertion on the inferior maxilla, above the inner end of the mylo-hyoid ridge.

The spasms in the muscles in this case are to be accounted for, as in the previous instance, by the catarrhal irritation conveyed to the sensitive nerves of the mucous membrane in the vicinity of the muscles affected. The irritation is thence conveyed to the motor nerves of the muscles in the catarrhal tract, and the latter, in an endeavor to eject the irritant, are thrown into a series of clonic spasms.

That these clonic spasms in the muscular structures of the nasopharynx, and the consequent snapping sounds, are produced by catarrhal irritation in the mucous membrane of the implicated muscular tract, is further proven by the cessation of the noises as soon as treatment has benefited the catarrhal state of the nasopharynx and nares. So far as the writer is aware, this is the first suggestion to quell reflex objective snapping noises in the ear by curing the nasopharyngeal catarrh, which very evidently underlies them as an exciting cause.

MYXO-FIBROMA AT THE BASIS CRANII, CAUSING BLINDNESS, AND SEVEN YEARS LATER DEAFNESS, BY DESTRUCTION OF THE LABYRINTH.

By J. J. B. Vermyne, M. D., *New Bedford, Mass.*

The case which I wish to report was occasionally seen by me, but during a period of eight years was treated by a number of physicians of all types; hence, its history cannot be given with entire accuracy.

Miss H. T. P., aged 20, consulted me in January, 1876, for occasional dimness of vision, which she had observed for a few weeks. The eyes were very soon tired and vision became blurred, while she thought her vision for distance was not quite so sharp as it used to be. The eyes are emmetropic, $V=\frac{12}{20}$. The ophthalmoscopic examination showed both disks congested and retinal vessels slightly distended. I advised rest for the eye, cold water douche and spirituous lotion to the forehead and temple. I saw her again in February. There was no observable change, but the patient declared that the eyes felt somewhat stronger. There was no other complaint at that time.

Toward the end of April of the same year she was sent to me by the physician who attended her for intense headache, specially occipital, occurring in periodical attacks. Vision had failed more rapidly. On ophthalmoscopic examination neuritis optica was easily made out, and this in connection with the intense headache led to the diagnosis of coarse disease of the brain, probably basal tumor.

There was no vertigo, no vomiting, no lack of co-ordination. The treatment prescribed consisted in large doses of Potass. Bromid. and Hydriod, and the application of Heurteloup's artificial leech to the temples every other day.

Under this treatment, which was continued during May the headache gradually became less severe and the congestion in the disc and retinal vessels decreased. Vision improved, and as she was fond of music, she began to resume practicing on the piano certain times of the day. Of course, the parents were highly elated with the result, but when I expressed my doubts about the permanency of the relief and my fears of severe cerebral trouble, the slight improvement notwithstanding, I lost the case, and the patient passed into the hands of a celebrated clairvoyant and magnetic physician of Boston. Occasionally I would receive some information with regard to my patient from outsiders who had seen her in the cars when on her regular visits for treatment. These reports were at first encouraging: she was improving. Then came the report that her vision was failing again, finally that she had become entirely blind.

I did not see the patient again until January, 1881, five years after my first treatment. She was rather loth to speak of the treatment received during that time, but begged me to try to do something for the restoration of her vision. Her headache, though at times very severe, was more paroxysmal; her mind perfectly clear, appetite and digestion good, no trouble about walking. The eyes have a staring look, pupils very large and showing no reaction at all upon strong light. Ophthalmoscopic examination shows secondary atrophy of both papillæ. I tried to persuade her that treatment would be of no avail, but she so persistently requested to have something done, that at last I consented, however reluctantly, to try hypodermic injections of strychnine. These were applied every other day for six weeks; as might be expected without any benefit, and treatment was entirely suspended.

Again I saw the patient in August, 1883. She had become suddenly deaf, so that the only way of communication could be by writing with the finger in the palm of the hand. Mind perfectly clear. No aphasia. Perhaps a little slowness in her answers. Drum-membrane of right ear opaque; of left ear normal; tubes patent. Tuning-fork faintly heard at left side; a little stronger at the right side. With my knowledge of the former history of the case I was compelled to make an ominous prognosis, believing that the neoplasma or whatever the character of the brain disease might be, had invaded the domain of the acoustic nerve.

The patient died in May of this year. From her family physician I gained the following information. The patient's father died of apoplexy. One sister had epileptic convulsions when quite young, and died at the age of eleven, a confirmed idiot. Another sister died quite suddenly when six or seven years old, cause of death unknown. He had made occasional visits to the patient when suffering from a severe attack of headache. The deafness which was the occasion of my last visit to the patient, lasted about six weeks, then hearing gradually returned, until he thought she could hear almost as well as before. This continued for about six months, when again the hearing began to fail and at last entirely disappeared. She suffered from intense headache, but there was no vomiting. There was paralysis of the left facial. No aphasia. A few days before death partial coma set in, and on the last day it was complete.

An autopsy was held 24 hours after death, according to a wish expressed by the patient herself, during the last weeks of her life. I am indebted to Dr. Wm. N. Swift of this city, for the following report of the condition of the brain.

"A tumor was found, situated in the anterior portion of

the left inferior occipital fossa, lying beneath the tentorium cerebelli and being adherent on its anterior inferior surface to the dura mater, covering the petrous portion of the left temporal bone.

The tumor was 6 cm. long, 4 cm. broad and 2 cm. thick. It was somewhat lobulated and on its anterior inner surface were situated two small nodules, one the size of a pea, the other slightly larger. The tumor was entirely surrounded by a membrane, except at the point where it was adherent to the periosteum of the petrous portion of the temporal bone.

The cut surface was smooth and glistening, of a greyish yellow color, with red points and streaks and bright yellow patches. There were many calcified plates, some at least one centimeter long.

The pia mater of the cerebellum was normal and there were no adhesions between it and the surface of the tumor. The left lobe of the cerebellum was compressed by the tumor at least one-third of its original volume. Its substance was intact, but very anæmic and of much increased consistency. The right lobe of the cerebellum was also very anæmic and of increased consistency.

The brain was anæmic, convolutions flattened and there was dilatation of both lateral ventricles, each containing about 30 grammes of serous fluid. The microscopic examination of the tumor showed it to be a myxo-fibroma, which had undergone extensive fatty degeneration, and with much deposit of lime salts. The two small nodules on the anterior surface of the tumor consisted almost entirely of fibrous tissue."

The posterior surface and top of the pyramid, corresponding with the places where the projecting nodules just mentioned were found, were largely eroded. It was removed with chisel and hammer. There is hardly a trace of the anatomical parts of the bone recognisable. A large

oval opening leads directly into the tympanic cavity, closed by a perfectly intact drum-membrane. No trace can be found of the acoustic nerve in the surroundings of the tumor. Whether this was attributable to the difficulty of removing the brain in order not to disfigure the body, or whether it was absorbed by pressure I am not able to state. The optic nerves were both shrunken.

From some after information I learned that she had not been able to hear with her right ear for a number of years, cause unknown, probably chronic catarrh of the tympanic cavity. Also that during the last weeks of her life she walked with difficulty, had to be supported in order not to fall. Her attending physician had attributed this to her blindness.

The points of interest in this case are:

The first symptoms shown by the neoplasma were those of the eyes. At the occasion of her first visit eight years ago there was no other complaint.

The tumor probably had its origin in the dura mater, affecting the substance of the cerebellum and the brain only by mechanical pressure. Being of slow growth it may account for the absence of any of the symptoms which might ensue from a more rapid encroachment on the substance of the brain and cerebellum.

The destruction of the temporal bone was due directly to malnutrition, produced by the two nodules at the anterior surface of the tumor, the microscopic appearance of which shows them with certainty to be the most recent developements in the growth.

There is a peculiar analogy in the symptoms both of the organs of vision and of hearing, nl. a serious functional disturbance, followed by a period of partial return of the function, and next by complete loss of both these senses. With regard to the power of hearing, it seems to me that the first attack of deafness was due to pressure upon the

blood-vessels, and the latter by pressure upon the nerve itself within the meatus auditorius internus.

DISCUSSION.

Dr. Theobald did not exactly understand; was there a return of hearing after complete deafness?

Dr. Vermyne answers, the information which he obtained from the family physician was that she could hear again as well as before. The hearing, however, was not completely lost at his visit nine months before her death, because, as stated in his paper, she heard the tuning fork faintly when applied over the vertex, but she was practically deaf.

He thinks that probably the return of hearing was due to the fact, that at first the deafness was caused by pressure on the blood-vessels, to which the circulation gradually accommodated itself, but afterwards the growth encroached upon the auditory nerve and then the final deafness occurred, which necessarily must have been complete, judging from the results of the autopsy.

TUMORS OF THE AURICLE.

By Charles J. Kipp, M. D., *Newark, N. J.*

A CASE OF EPITHELIOMA OF THE AURICLE.

E. C., aet. 19, a strong and healthy looking boy, consulted me with regard to a growth in the concha, which he wanted to have removed. According to his statement, this growth began to appear a week before. The ear had never been seriously injured, but he thinks that a short time before the growth was first noticed, he scratched this part of the ear. Previously this ear was entirely healthy.

On examination I found the concha the seat of a small fleshy growth, with a granular surface. The tumor was about 7 mm. in height and its base measured about 12 mm. in length and 7 mm. in width. The growth partly closed the meatus.

On the upper part of the auricle were several small boils, and below the ear was felt an enlarged gland. There was no disease of the external canal or of the middle ear, and the hearing was not impaired.

Although this growth looked very much like a large mass of granulations, it felt considerably harder to the touch than granulation-tumors commonly do. Judging from the history of the case, it seemed to me that the growth could not well be anything else than a granuloma and I therefore advised its removal. Consent having been given, I removed the whole mass with the sharp spoon, taking care to scoop out the cartilage very thoroughly.

There was but little hemorrhage. The wound was dressed with borated cotton, and cicatriced completely in about a week. At this time a furuncle developed in the external canal and several others under the ear.

Since then, the patient has not been seen, and efforts made to ascertain his present condition have been of no avail.

The tumor was hardened in Müller's fluid for several weeks and subsequently kept in alcohol.

The microscopic examination showed the growth to be largely made up of epithelial cylinders, between which were numerous large round, oval and spindle-shaped cells, imbedded in a fine fibrillar tissue. The stroma was very vascular; many of the blood-vessels were distended with blood-corpuscles and reached nearly up to the surface of the tumor. This was covered everywhere, except where it was ulcerated, with a layer of epithelial cells, like those of the rete Malpighii and above these was a layer of horny cells. Many of the epithelial cylinders were in connection with this epithelial covering, while others were apparently offshoots of hair-follicles of which a few were seen in almost every section. The cells lining the cylinders were all serrated and contained a nucleus and a distinct nucleolus, while those in the interior were mostly horny. Pearl globules were found in many of the cylinders.

Remarks.—It is to be regretted that the subsequent history of this case could not be ascertained, since the very rapid development of the growth would seem to make it at least improbable that the tumor was really what the microscopical examination showed it to be—an epithelioma. Granulation tumors (polypi) originating from the mucous membrane of the middle ear often present a structure very similar to that of the tumor here described, and it must therefore remain an open question whether this growth was really a malignant one.

A CASE OF CAVERNOUS FIBRO-LIPOMA OF THE AURICLE.

The tumor occurred in a man 34 years of age. It was situated on the helix. It was about the size of an English walnut, and its size could be somewhat reduced by compression. The skin over the tumor was normal and was freely movable over it.

The tumor was first noticed two years ago, and has since gradually increased to its present size. The ear has never been injured, and the cause for the development of the tumor is unknown. The patient desired its removal on account of the deformity. The tumor was enucleated without the slightest difficulty, and there was scarcely any hemorrhage. The wound healed very quickly, by first intention.

The microscopical examination showed the tumor to be a lipoma, with much fibrous tissue between the lobules. In very many places the fibrous tissue had undergone a cavernous metamorphosis.

CASE OF HÆMATOMA AURIS IN A SANE PERSON TREATED WITH INJECTIONS OF ERGOT.

By Lucien Howe, M. D., *Buffalo, N. Y.*

As there are some doubtful points in the pathology of this affection, any facts bearing upon it are likely to be of interest.

These are illustrated by a case to which I would call attention, that of a woman, E. S., aged twenty-eight, whose general physical condition was excellent and family history good. Although her mental development was fair, she could not be called very intelligent and the fact that about six years ago she had occasional attacks of dizziness was the only one which gave a shadow of suspicion as to her former perfect health.

She said that about four years ago a swelling made its appearance in the left ear and continued increasing in size so rapidly that in a week or two it had reached its present size. Although the meatus was closed and the hearing thus greatly impaired, the absence of pain caused her to do little or nothing in the way of treatment, until the sudden appearance, about a month ago, of a slight tumefaction in the other ear caused her to seek relief.

At the time I first saw her, on the 29th of September of last year, the condition presented was as follows:

On the left side the concha was occupied by a tumor which filled almost its entire cavity. The tragus and antitragus were also about double the thickness of the same

parts in the other ear and the various portions of the enlargement about the external meatus, thus coalescing, entirely closed the opening of the canal. The skin covering these parts was slightly darker than elsewhere, and could be freely moved, but on firm pressure the tumor yielded perceptibly. In consequence of the obstructed meatus this ear was, of course, practically useless.

The right appeared to be normal, except that a similar, but very slight enlargement was distinguishable at the upper part of the concha. These conditions are illustrated by plaster casts which were made when the patient was first seen. The appearance is thus demonstrated and also described with some detail in order that the diagnosis may be established as clearly as possible. It is generally considered best to allow such extravasations of blood, to subside as best they may, but in the present instance, the patient being practically deaf in one ear and with every prospect of becoming so in the other, some interference was deemed warrantable. It occurred to me that it might be worth while to try the effect of ergot used subcutaneously. Accordingly, on the 26th of October, I injected two minims of the fluid extract into the tragus of the left ear. This produced considerable pain, and at first there was some tendency to sloughing. In about a week, however, the injection was repeated, the dose being then increased to four minims, and subsequently at intervals of eight or ten days for nearly two months, the dose ranging from two to five minims. Some decrease in the size of the tumor was distinctly marked by the first of December, and although the injections were discontinued early in January, still further improvement was shown till February.

By the 18th of that month the growth had retracted to at least one-half its former size. The canal was open to such an extent that the smallest Gruber's speculum could be partly introduced, and the hearing was changed from the

perception of loud vocal sounds to distinguishing a whisper at eleven feet or the watch at $\frac{45}{60}$. I desired at this stage to make a second cast of the left ear, but the patient would not submit to the inconvenience of the plaster, and I was therefore obliged to content myself with one made from a wax impression, and from measurements as accurate as could be taken. It is but right to make this statement in presenting the second model of this ear.

There appear to be three points in the history of the case worthy of some notice. In the first place, the disease is rather rare in the female, Dr. Hun, for example, having observed it twenty-three times in men, but only once in the female.

Again, it is usually associated, as is well known, with some form of insanity, either paresis, melancholia, or mania. A few other cases are to be found in the literature, occurring in the sane, but those of Langenbeck, Loring, and one or two others, constitute the entire list.

Finally, I am not aware that this method of treatment has been attempted before. Nor are there well established clinical facts which would warrant great expectations from the use of ergot under such circumstances. It is possible that similar contractions might follow the subcutaneous injection of any other alcoholic or irritating mixture. But from some theoretical considerations this would seem to promise well, and the result justifies the anticipation, if judged merely from the evidence furnished in a single case.

DISCUSSION.

Dr. Sexton has in his collection of photographs some illustrations of hæmatoma. He exhibits an example of othæmatoma, occurring in the insane.

He recently had the opportunity of examining a number of othæmatomata occurring in the sane. He had supposed

this to be rare in the sane until he made some recent investigations. He found that among pugilists this affection of the ear is almost universal. After a pugilist has followed his occupation for some time, he has developed, usually on the left ear, othæmatoma, exhibiting the usual characteristics. After recovery from the trouble the patient is not liable to its recurrence.

He shows further a typical example of the early appearance of othæmatoma from trauma, occurring in a gymnast connected with one of the colleges. He was accidently struck on one of the auricles by a pupil, with the result as shown in the photograph. It produced an othæmatoma on the exterior portion of the auricle, between the helix and antihelix. The case was under observation for three or four weeks and almost perfect recovery took place.*

It is supposed that this affection often arises spontaneously in the insane, but he is satisfied that it scarcely ever arises spontaneously in any case. Careful investigation in lunatic asylums, shows that the insane are constantly hammering and bruising their ears, or else rubbing and pulling them, thus keeping up a constant condition of irritation. It is difficult to keep them from fighting and blows on the auricle are exceedingly frequent. In his private practice he has always been able to trace the condition to trauma. In one case a gentleman playing with his child brought his hand against the auricle, doubling it up with some force. He has never seen a case of spontaneous othæmatoma, and he doubts whether it is common even in the insane. He presumes that it may be possible, but he thinks that it is rare.

In regard to treatment, he would say that he has found a temporising course to be of little service. He has tried small injections of iodine, but they aggravated the

*See for full account of these cases, with illustrations, "The Medical Record," 1884. Vol. 26, Nos. 1, 5, 6 and 7.

case without doing any good. In milder cases he has resorted to the withdrawal of the blood by aspiration. This should be repeated as often as was necessary. Where a large clot has formed, it may be necessary to make an incision, but this is rare. He should not permit these cases to go on to spontaneous rupture as some do. The cavity refills very rapidly, it being necessary sometimes to withdraw the fluid once or twice a day. There is nearly always deformity. In the most favorable cases, some of which he has reported, the deformity was very slight.

Dr. Pooley has observed some years ago while making an examination of the eyes of the patients in the Epileptic Hospital, on Blackwell's Island, a case of double haematoma, with detachment of the retina in both eyes, which was produced by the patient himself. He had protracted attacks of mania in which he believed that he was possessed with the devil, whom he endeavored to thrash out. He subsequently developed cataract and was submitted to the operation of extraction which resulted very disastrously.

Dr. Sexton adds that in one of these cases, the eye brows had entirely disappeared from the habit of the patient rubbing his eyes.

Dr. O. F. Wadsworth observes that it is stated that the Greek statues of pugilists had their ears deformed as they would have been from hæmatoma.

Dr. Howe does not believe that in all cases this condition can so easily be ascribed to an injury. If it is, we must admit that a very slight injury may produce it, often so slight that the patient is unconscious of the fact that he has had an injury. From the idea that it is an effusion beneath the perichondrium, we should expect it to occur immediately after the injury. In an article by Dr. Hun, this question is very carefully discussed, and he comes to the conclusion that in many cases the condition must be

attributed to some other cause than trauma. It is fair to suppose that the injuries which the insane receive would be such as would be likely to produce it.

Dr. Sexton would remark that othæmatoma arising in the concha is rare. He has never seen the tragus affected in any case. He believes that in many of these cases, there is a predisposing cause, but he believes that it is also necessary to have some exciting injury. The injury may be very slight where the pre-disposition is marked.

JEQUIRITY TREATMENT OF SUPPURATIVE OTITIS MEDIA.

By W. W. Seely, M. D., *Cincinnati, O.*

We have had time now to recognize the short-comings of the latest contribution to our treatment of chronic suppurative inflammation of the middle ear, and boracic (boric) acid has its short-comings along with the entire catalogue of remedies and plans.

I do not know how it is with others, but each year establishes on a firmer and broader basis for me, the necessity for fulfilling certain conditions in order to obtain the greatest success in this class of cases; first, *cleanliness;* second, *rendering and maintaining the Eustachian tube patulous* and third, *getting the naso-pharynx into a healthy state.*

I am satisfied that this last point is too little regarded by some, and utterly ignored by many.

But there are cases in which the mucous membrane of the cavitas tympani gets into a state that can practically only end by its becoming changed into cicatricial tissue, like for example the conjunctiva in trachoma, either in its entirety or in part. As you all know obstinate cases of "pannus" have been treated by means of inoculation with blennorrhagic pus with the result, its total removal as well as the remains of the trachoma of the lids. This plan, owing to its destructive character, will now only be a matter of historic interest since the introduction of late by De Wecker of jequirity for exciting a "substitution" inflammation.

For a year or more I have occasionally, in some long standing cases of suppurative otitis media, had used at my Dispensary and have used myself in some private cases, jequirity, for bringing about a thinning of the thickened mucous membrane, with a fair proportion of good results. The solution is simply put into the ear by means of the probe and cotton, or a few drops poured in. There always results a profuse discharge and sometimes a good deal of pain, though so far this latter has not been so uniformly present as when the conjunctiva is inoculated. No farther treatment is instituted after the application, except keeping the ear clean once a day. In only one case was reaction excessive, and in this only for one or two nights.

From my limited experience I am inclined to think that such inoculation is capable of playing an important role under certain conditions.

First, when there is extensive destruction of the membrana tympani.

Second, a great amount of thickening of the mucous membrane, thus rendering other plans futile or tedious.

Third, a patulous Eustachian tube—this latter affording the means for controlling the inflammation.

DISCUSSION.

Dr. Pooley inquires what the strength is of the solution.

Dr. Seely answers that it is practically a saturated solution. Its effect lies more in the mode of applying it.

Dr. Knapp says that between a 1 % and a 3 % solution the action is uncertain and difficult to determine. He has used the same solution in different cases. In one it would have no effect, in another a mild effect, and in a third produce destructive results. Destruction of the cornea occurred in a case where it seemed most indicated, a case of old pannus, with more or less cicatricial conjunctiva

with only here and there some islets of transparent tissue.

Dr. Pooley would like to ask whether jequirity ever produces reaction extending to the throat.

Dr. Seely has not seen it.

Dr. Pooley says that very alarming effects have been reported where the application has been made to the fauces.

Dr. Seely uses only the infusion. He has used it in twenty or thirty cases with good results.

Dr. Knapp would like to have a detailed statement of these cases.

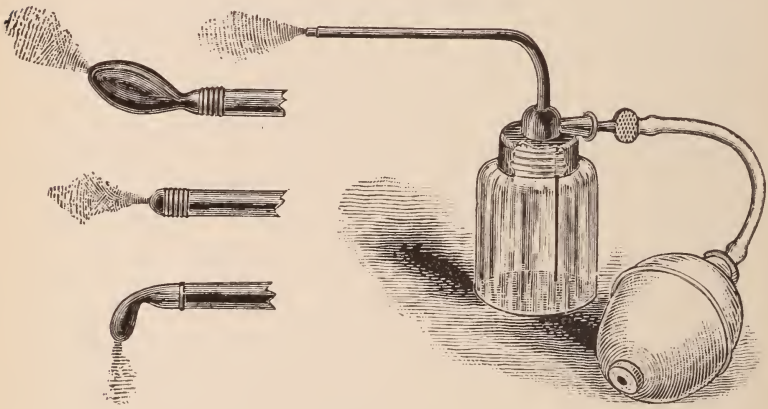
Dr. Pooley says that in the case of the eye, the presence of purulent discharge is a contra-indication to the use of jequirity.

Dr. Knapp remarks that the use of jequirity may be followed by purulent discharge, where there was none before.

A CONTRIBUTION TO THE MECHANICS OF NASO-PHARYNGEAL PRACTICE.

By H. N. Spencer, A. M., M. D., *St. Louis, Mo.*

The accompanying cuts to this article represent two simple mechanical devices which have served me so good a purpose in the treatment of nasal and naso-pharyngeal complications to aural difficulties that I submit them to the Society. The first (see cut No. 1.) I shall not dilate upon.



No. 1.

It is simply a modification of the powder-blower in most common use (Robinson's) and is intended to obviate an embarrassment which I have sometimes experienced, *i. e.*, the blowing out of the rubber cork and with it the contents of the bottle. The latter occurrence, which neces-

sarily follows the former, is intensely disagreeable to both patient and operator if such a powder as, for example, iodoform is being employed. The modification consists in the substitution of a screw cap for the cork, the internal or female screw being moulded in the bottle.

The second appliance (No. II.) is for the purpose of producing an instantaneous spray effect, which can be limited in great measure, to the point which it is desired to operate upon. It is composed of three parts, to wit; a nasal speculum, which has been described,* a stem

No. II.

and a bulb or receiver. The stem is introduced through a central perforation in a bar set in the proximal or expanded end of the speculum and protrudes just so as to escape the smaller end for insertion into the nostril. The bulb prevents the fluid from being drawn into the tubing and serves to produce also a more efficient atomization. The single hand-ball is required to take up the fluid and to expel it.

The importance of treating diseased conditions, diffused or circumscribed, of the naso-pharyngeal mucous membrane — where there exists deafness or tinnitus or any other symptom of aural disturbance — for the influence which it will exert upon these derangements is, I believe, fully appreciated. The importance of a careful examination and the treatment of the nasal mucous membrane in incipient

* "The mechanics of naso-pharyngeal practice." By H. N. Spencer, M. D., St. Louis Courier of Medicine, July, 1879.

ear-disease is, I think, not sufficiently urged in the text books.

Experience has proved to me sufficiently that the acute otitis media of children might often be averted by a prompt and judicious treatment of the coryza, to which it is a sequel. During the past winter I have been called a number of times to see young children suffering very intensely from pain in the ear, where dry heat employed externally and the application of a spray of argent. nitrat. [gr. 2, 3 to the ounce] to the nostrils have been sufficient to relieve the pain and to cause the injection of the tympanic vessels to disappear.

I have merely mentioned this as suggestive of the use to which such a little instrument may be put. I shall not attempt to explain the process by which such a result is effected, which explains itself at once to those who consider the anatomical relations and the reflex sympathy between these antipodal points of a common membrane. The applicability of this method of treatment is not limited to the condition just described. It is useful wherever the indication exists for the employment of such agents as nitrate of silver, acids or resinous solutions—where minute quantities are required or the application needs to be localized.

NECROSIS OF THE RIGHT LABYRINTH. TOTAL FACIAL PARALYSIS ON THE SAME SIDE. PARTIAL RECOVERY.

By Charles A. Todd, M. D., *St. Louis, Mo.*

Maggie ———, aged 19. When four years old she had measles followed by discharge from both ears, which persisted up to the time of her appearance at the clinic in 1873, a period of four years. Under treatment the left ear ceased to discharge and the perforation closed. Like out-patients in general, she neglected to attend as the aural condition improved, so that from time to time she would appear with an aggravation of the persistent disease in the right ear; the right mem. tymp. exhibited a perforation in the posterior upper quadrant, out of which later granulations protruded. I succeeded in relieving this condition under the dry method. The granulations disappeared and the discharge was reduced to a minimum; no dead bone at this time could be discovered. The patient now absented herself and nothing more was done until Nov. 15, 1882, when I was desired to visit her at her home. Found her suffering from a deep seated mastoid pain, that had been gradually increasing for thirty days; there was, however, neither swelling nor redness over the mastoid. Under treatment the pain subsided, when there was manifest complete paralysis of the right side of the face. Dead bone was readily felt with the probe at the bottom of the meatus amidst abundant granulations.

March 7th, 1883, under ether, attempted to remove the

sequestrum, but found it still fixed. Some days later it was loosened and extracted without difficulty; it proved to be part of the cochlea. The granulations now rapidly disappeared and the discharge as well: the paralysis remained as before. On testing the condition of the chorda tympani nerve, I found complete loss of taste in its territory; the general sensibility of the tongue did not seem to be altered.

To maintain the integrity of the affected muscles, the faradic current was applied, at first with no response, but after a few days a flickering action was observable in the orbicularis oris and compressor nasi only; the patient complained of the wind and dust irritating the eye, since it could not be closed. April 9th, the mouth was much less distorted and later the eyelids could be fairly closed. At this stage the treatment was interrupted, and not until autumn was it resumed, the interrupted battery current being used in hope of improving the innervation, as all local inflammatory action had ceased and the mem. tymp. cicatrized. H. D. R.=o. During the past winter the electrical treatment was continued very irregularly, as no good result was apparent, more to satisfy the patient than in any great hope of success. However, indications of renewed contractility under influence of the will justified perseverance, and for the last three months the battery has been used regularly three times weekly; the positive electrode under the ear, the other stroked over the muscles.

June 20th. The mouth presents no other abnormity at rest than a little too much fullness in right lower lip; but in smiling the mouth goes at once to the left, although at command it is readily drawn backwards to the right. The patient, also, can whistle; though the lips are not fully puckered. Eyelids close with some force. The right angle of the mouth can be slightly raised but not depressed; also the corrugator supercilii acts faintly of late. No action in occipito-frontalis.

This case I have presented as a contribution upon the subject of facial paralysis consequent upon the severest nerve lesion outside the centres. Some of these cases seem to be capable of spontaneous recovery; but it is hazardous to leave all to nature, while the process of muscular degeneration is advancing and the rëestablishment of innervation doubtful.

TRAINING THE HEARING OF DEAF-MUTES.

PROF. F. D. CLARKE, *of the New York Institute for Deaf-Mutes, New York, N. Y.*

Mr. President and Gentlemen of the Society:

I come before you as a representative of a Committee of a Convention of Teachers of Deaf-Mutes by the Oral Method, held in New York City on June 25th to 28th.

At that Convention the fact that a very large percentage of the deaf and dumb could hear was brought out, and the experiments of Prof. Gillespie of Nebraska, for upwards of a year and a half with a class of these hearing deaf-mutes, seem to establish the fact that this hearing can be trained or developed, to such an extent, that many pupils who, under the common method, would go out from the Institutions practically deaf-mutes may be made simply hard-of-hearing speaking persons.

We are requested to report to the teachers of the deaf "such tests of hearing, such methods of treatment and cultivation as the subject demands." The chairman of our committee, Prof. A. Graham Bell, is an honorary member of your Society, and was especially anxious to bring the matter before you, but being unable to attend your meeting, I request such information as you can give me on the following points.

1st. A test for hearing of such a nature that the results obtained by different observers can be compared.

2d. Any means of determining the difference between

hearing and feeling in persons who may have never heard.

3d. Any method or course of exercises that could be used in our Institutions to develop, improve or train defective hearing.

4th. Any precautions that should be taken to prevent injury to diseased ears by shouting or making loud noises near them.

I am emboldened in taking up your valuable time by the fact that there are 65 Institutions and Schools for the deaf in the United States, and more than 400 in the world, in many of which any recommendations you may make will be tested.

The test for hearing we hope we have found. Hughes' audiometer is too complicated and cumbrous for our purpose, and is not loud enough. By substituting for the battery and current-breaker of that instrument a magneto-electric machine generating alternating currents so rapidly as to produce in a telephone a musical sound, we have a ready means of testing hearing, as the strength of the current and consequently the loudness of the sound depends upon the position of the armature; and for finer gradations we have the same induction coils that Hughes uses, thus getting two means of graduating the sound produced.

This instrument, which will be simple, compact and durable I hoped to have been able to exhibit to you, but the makers have disappointed me. Thanking you for your kind attention, I await any information you can give me.

DISCUSSION.

Dr. Sexton states that recently during a visit of Prof. Bell they had some conversation on this subject. He is inclined to believe, speaking in general, that there is a good

deal of miscomprehension on the part of deaf-mute instructors in regard to this matter. Some imagine that the sense of hearing may be improved by instruction. This he does not think is a possible thing, although there seems to be scarcely any limit to the improvement of the perceptive sense by education.

In regard to hearing tests for the very deaf, those in use answer every practical purpose but they are totally inadequate in the more profoundly deaf and where autophonia exists. He promised Prof. Bell to give the matter further attention with a view to devising a ready method for universal use among teachers.

Dr. Samuel J. Jones said that he believes that the statistics based upon the records of deaf and dumb institutions, are very unreliable in regard to deaf-mutes. Many cases are reported and recorded, at such institutions, as congenital deafness, when examination of the ears of these persons would show evidences existing of structural change in the ear, which probably occurred early in life, and prevented hearing, and the person, in consequence, never learned to speak. Statistics based on such records must be unreliable. So fully convinced of this is he that in his own state he has advocated the appointment of a competent aural surgeon at the deaf and dumb asylum, being satisfied that whilst being taught the sign language to instruct them, much may be done, by treatment, to enable them to hear and to speak. Some of them, he believes, can be so much improved that they may be removed from such institutions. At his suggestion Dr. Tilley, of Chicago, has been conducting some examinations at the deaf and dumb asylum at Jacksonville, Illinois, with results which accord with the view Dr. Jones has expressed, and he believes this subject merits more thorough investigation, in the interest of humanity, and in furtherance of the science of otology.

Dr. F. B. Loring has been surgeon to one of the largest deaf-mute institutions for the last seven years. He has never seen one case that he was able to improve to the slightest degree. In a certain number, something was done to check discharge, and to make them more healthy, but he has never been able to improve the hearing. He differs from Dr. Jones in regard to the unreliability of statistics. He finds that the parents have a pretty clear idea as to the cause of the trouble. He was also struck with the fact that the proportion of congenital cases was remarkably small in comparison with the total number of deaf-mutes.

Prof. Clarke states that it is 46 % in the whole country.

Dr. Loring remarks that in this institution it was only 5% or 6%. Cerebro-spinal meningitis was the most frequent cause. In these cases he does not think that much can be done. He believes that an immense amount of comfort may be afforded to these patients and the general condition of health can be much improved.

Dr. Sexton observes that some years ago he made some visitations to the deaf-mute institutions about New York to determine whether there were many cases that could hear. In examining a large number of cases he found a few who could hear the voice well enough to be instructed by other methods. Where we do want some reform is in reference to the partially deaf pupils in our public schools. A very considerable number of school children are too deaf to be instructed by the ordinary methods.

Dr. Kipp says that in his city, Newark, N. J., those who can not hear well are either placed near the teacher or sent away entirely.

Prof. Clarke remarks they frequently have pupils sent who they consider ought to be taught in the public

schools. If put under their method of instruction they become deaf-mutes.

He remembers one boy who graduated in the New York institution. Some time afterwards he went to the factory and inquired for a deaf and dumb boy named Charles So and So. He was told that a boy of that name worked there, but that he was not deaf and dumb. He found that he could hear well in the noise, but not away from it.

Dr. Kipp has frequently advocated that these children should not be compelled to spend all their time in the company of other deaf-mutes, as is now the case in most of our Institutes for their instruction, but should attend these schools as day scholars and live in families with children who can hear and speak.

Dr. Sexton believes the opinion is now growing that not only those hard of hearing, but also deaf-mutes should be taught in day schools. This is successfully done in Boston, Pittsburgh, Cincinnati, Chicago and other places, but it is not done in New York. He has made several attempts in that direction, but has never been able to get the Commissioners of education interested.

Dr. Loring did not mean to say that a great deal could not be done by treatment in early life, but that in his experience those who had been in the deaf-mute college for a certain length of time could not be put under treatment and then suddenly hear. It seems to be a general idea that the sense of hearing is something like a muscle; that it is something which can be toned up and developed. When the audiphone was invented all these cases thought that they were going to hear.

Dr. Bartlett believes that it is a matter of development. A gentleman in charge of a large telephone exchange stated to him that he considered the telephone might become of some benefit to those hard of hearing, for he had noticed that many when they first came had

great difficulty in hearing the instrument, but after some practice heard through it readily. He had not noticed, however, that they heard conversation any better. It is said that the Indians acquire the faculty of hearing sounds that we cannot hear. It is probable that the human voice is the best instrument to cultivate the hearing.

PROF. CLARKE should like to have some means suggested by which we can distinguish in deaf-mutes, the difference between hearing and feeling.

DR. THEOBALD thinks that as regards the examination as to whether or not a patient can hear, we can get behind him with a bell and tap it, strike it pretty close to the ear. With an instrument of this kind which will give a sharp, clear sound we can determine whether or not the patient hears. If a vibrating body is placed in contact with the bones of the skull, then comes in the difficulty that they feel the vibrations and think they hear them.

PROF. CLARKE says that nine-tenths of the deaf-mutes would feel the bell if it were rung in this room. They can feel the bell if the sense is trained.

DR. SEELY asks if what Prof. Clarke wants to get at is to develop the nerve of hearing by this instruction.

PROF. CLARKE answers in the affirmative, if such a thing is possible. The case which caused him to think such a thing possible was this: There is in New York a congenitally deaf-mute, who, when admitted to the institution was considered totally deaf. Since then, hearing has continually improved up to the present time. He has also acquired speech. No special test has been made. He can however, hear in the dark.

DR. SEXTON thinks that the sense of feeling is similar to that of hearing. The latter, however, as compared with the former, is constituted more especially of a perceptive centre, responsive to the more delicate vibratory movements. All deaf-mutes are conscious of vibratory impressions in

some way or other. The practical question is: Can deaf-mutes be instructed by the ear? If they can not hear ordinary sounds, it would be useless to attempt to teach them by the ear.

PROF. CLARKE says there is another question: Is there any danger in speaking loud or using trumpets with these pupils?

DR. SEXTON thinks there would be no danger unless the patient should object to it. When deaf-mutes hear thunder, it probably produces in a certain degree concussion of the brain and this is the reason that it is painful to them. It produces shock.

DR. HOWE moves that the matter shall receive official recognition by being referred to a committee of three, of whom the chairman shall be the president of this body, he to appoint the two other members. Adopted.[1]

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[1] See notice on last page of transactions. J. J. B. V.

VERBAL COMMUNICATIONS.

SARCOMA OF THE CONCHA AND DEFORMITIES OF THE AURICLE.

Dr. Samuel Sexton, New York, N. Y., presented a case of sarcoma of the concha which is, he believes, very rare. He has not brought the history of the case with him, but there was some irritation at the bottom of the concha which had been treated rather actively, he believes, with nitric acid. This caused considerable irritation and there rapidly appeared a tumor which was nearly three-fourths of an inch in height. The tumor was removed with scissors, its base well scraped, and afterwards thoroughly cauterized with Paquelin's thermo-cautery; a complete cure was effected. Professor W. H. Welch made a microscopical examination and found it to be a case of sarcoma.

He exhibits some illustrations of malformations of the auricle which he thought might be of interest to the society, especially as the collection contains two varieties which he has not seen described anywhere.

He believes that it is well known that the imperfect closure of the first branchial cleft is frequently followed by fistula auris congenita, and this is not very unusual. In this case there was probably imperfect closure of the first branchial cleft, and in front of the tragus there is a growth or nipple in place of the fistulous opening usually found. Having seen a considerable number of these cases, he concluded to get a photograph. He can attribute this to nothing else than a malformation occurring during closure of the cleft.

In connection with this, he wishes to show the other case where there seems to have been closure of the cleft beneath the integument in front of the tragus on both

sides. In this case there was the formation of quite a swelling, making a tumor with fluctuation. These cases at first puzzled him very much, and in the first one that came under his observation he was disposed to open it, but it finally got well without. In some of the cases seen there was considerable pain and tumefaction in the part. In the photograph presented swellings can be seen in front of both ears.

Dr. Kipp states that with regard to branchial fistula, he has described several cases in which this tumor occurred, in which he could evacuate the cyst through the fistula.

Dr. Sexton answers that this was different. In these cases the fistula never opened externally, but left a tumor in front of the tragus. He simply presumes that that was so from the symptoms.

Dr. Kipp answers that the opening is sometimes quite far away. He has found it near the helix.

INFLUENCE OF DENTAL IRRITATION ON DISEASES OF THE EAR.

For some years Dr. Sexton has taken special interest in regard to the influence of dentition and affections of the teeth on diseases of the ear, and in a large number of cases where the teeth were found to be the source of radiated nerve irritation he had plaster casts of them carefully taken by Messrs. J. M. & R. O. Stebbins, dentists of New York. In one cast, exhibited from Dr. Sexton's collection, it is evident that the first teeth are carious and that there are a number of fangs in the jaw. This patient came with acute ear symptoms which did not yield to treatment. Dr. S. finally had the dead teeth and fangs removed, and in an other cast the result can be seen. The gums are healthy, and the central incisors are presenting themselves. There was a rapid recovery. That was a child of about seven years of age.

Dental troubles giving rise to aural diseases are, however, not confined to youth; they are found at all periods of life:—Thus, in a cast taken from an old person, caries is seen to be present. The irregular collections of tartar are well marked.

In another cast, (No. 17), he would call attention to the manner in which the wisdom teeth are erupting. In this case there was trouble in the ear of either side as these teeth came in.

In connection with the cast he would call attention to the inferior maxillary bone in which the wisdom teeth are just erupting. Fig. 1. On the one side there is no room for the tooth and a great deal of irritation must be caused from pressure on the periosteum of this side. On the other side, the tooth has erupted because the tooth next to it has been removed, but it is coming through in an irregular manner. The disturbance caused by these teeth is sometimes very great; the parts are not only subject to great swelling, but the suffering is often of a severe character. When mastication is attempted, the gum over the tooth is liable to be bruised and thus

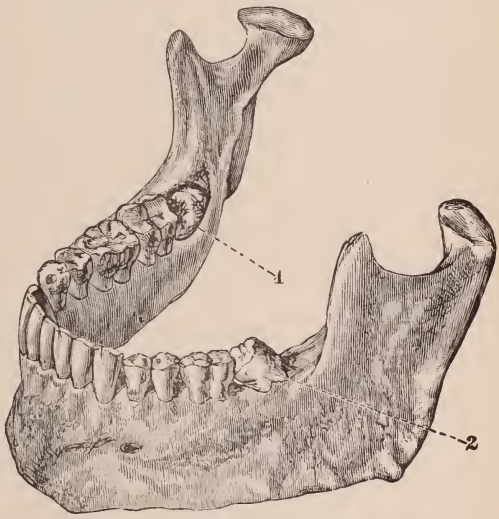


FIGURE 1.—Lower jaw or inferior maxilla, from a specimen in Dr. Sextons collection. The figure shows the horizontal position of the lower wisdom teeth, the position which gives rise to their difficult eruption. 1. The right wisdom tooth, which is wedged in between the ramus, or upright portion of the jaw, and the second molar tooth; it has not, as yet, been able to leave its socket and cut through the gum. As the tooth is urged onward in the effort to erupt, it is forced against the sensitive root of the neighboring tooth, the pressure giving rise to much irritation. 2. The fully erupted left wisdom tooth; it is inclined toward the first molar; the second molar on this side having been lost, room was afforded this tooth to cut through the gum.

increases the irritation. Sometimes the irritation goes on for years, until nature seems to exhaust her expulsive forces, without completing the process of eruption; pains may or may not be experienced, sometimes they seem to shoot from the tooth to the ear. Through nervous sympathy the ears are very often affected. The two upper wisdom teeth usually erupt a short interval after the two lower and are cut with less difficulty.

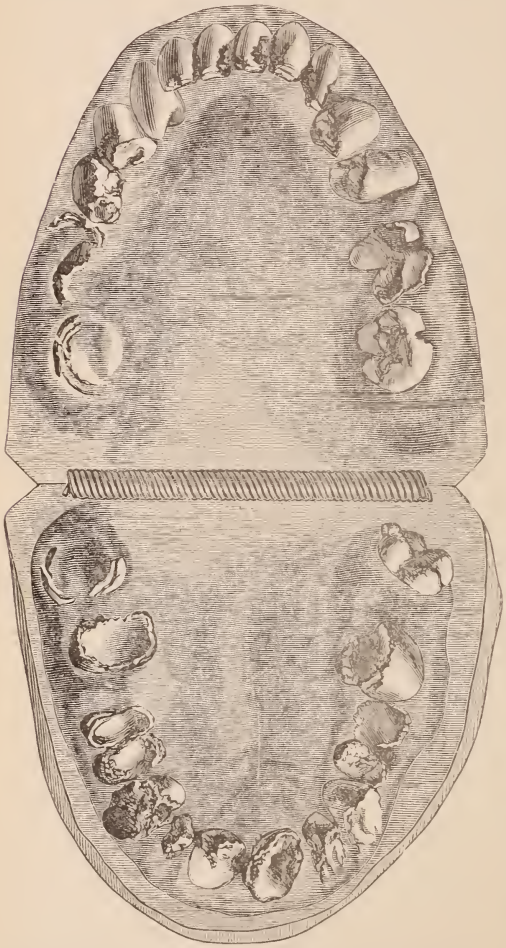


FIGURE 2.—View of plaster casts of the upper and lower teeth (No. 14 of Dr. Sexton's collection) of a youth aged twenty-two years.

The cast shown in Figure 2, represents another case. This person always had trouble with his teeth; they ached severely in childhood while he was at school, and he has had brief periods of immunity only since that time. His teeth were in so bad a state that mastication of food was well nigh impossible, for the pulps were exposed in nearly every one of them and the pressure of solid food on

the pulps gave rise to so much pain that the food was bolted down hastily. The dental nervous filaments being in a state of constant irritation, not only gave rise to neuralgias of the head, but the whole system also sympathized. The food was retained about the jagged remains of the teeth, and becoming decomposed, was taken into the stomach along with the purulent matter from the diseased gums; thus, contaminated by the secretions of the mouth and imperfectly masticated, it caused an aggravated form of dyspepsia before the patient was sixteen years old.

This person, when he came to the New York Eye and Ear Infirmary, where he was first seen, was found to be very deaf in both ears, and the right one was the seat of a very painful inflammatory affection; he complained of being very weak, and his appearance was that of a person who had become prematurely old. His face was pale, the cheeks having dirty-brown patches, from which the outer coating of the skin could easily be rubbed off. His eyes were weak, and a discharge from them had to be constantly wiped away. In regard to the teeth in this case it may be said that the patient never knew what it was to possess the use of them in a normal condition, for all of the back teeth of the second set probably came into the mouth in an imperfect state (deficient in enamel) and were therefore easily destroyed by disease, while the front teeth decayed from neglect to keep them clean.

The effect of dental trouble among children is well shown in this cast, Fig. 3. It shows the teeth of a school girl twelve years of age. The casts are represented as being held together by a hinge. 1, 1. indicates the second bicuspid teeth of the upper jaw, both of which have been crowded out of place as they erupted by the remains of the fangs of the temporary second molar teeth; these fangs, which have been too long retained in the gums,

are seen in the cut just inside the second bicuspids. The retention of the fangs, together with the crowded and irregular condition of the permanent teeth which have just been cut, give rise to much irritation. This anomalous condition of the teeth is by no means an unusual occurrence where the teeth are neglected. The left upper six-year old molar tooth which is very carious is seen at 2, and the two lower six-year molars, both of which have been destroyed by caries at 3, 3. The little girl from whose teeth these casts were taken suffered from deafness, and frequent attacks of pain in both ears, and, as she herself expressed it, "the decayed teeth had ached very much all around."

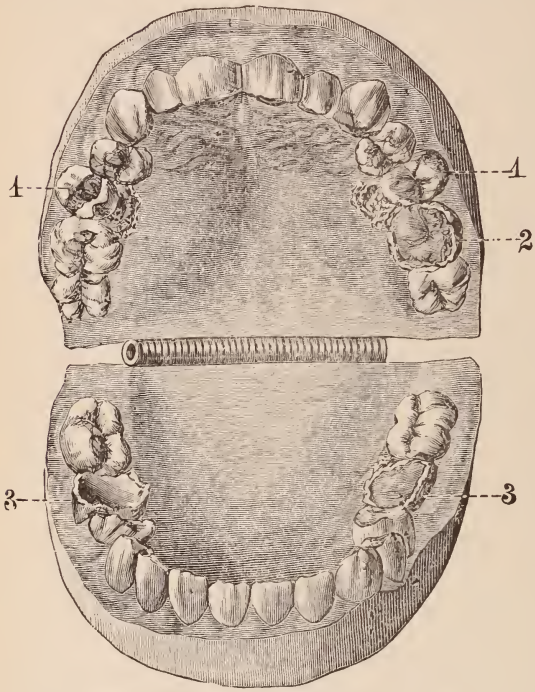


FIGURE 3.—Casts of the teeth of a school girl twelve years of age; from the author's collection

Still another cast shown, Fig. 4, exhibits very extensive irregularities of the teeth in an English lad seventeen years of age. In this case the reflected nerve irritation must have affected the ears more or less (the patient was very hard of hearing) and owing to the extraordinary deformity (contraction of the superior maxillary arch,

ect.) closure of the mouth was prevented, giving rise to habitual mouth breathing. Tympanal æration was further interfered with by enormously enlarged tonsils.

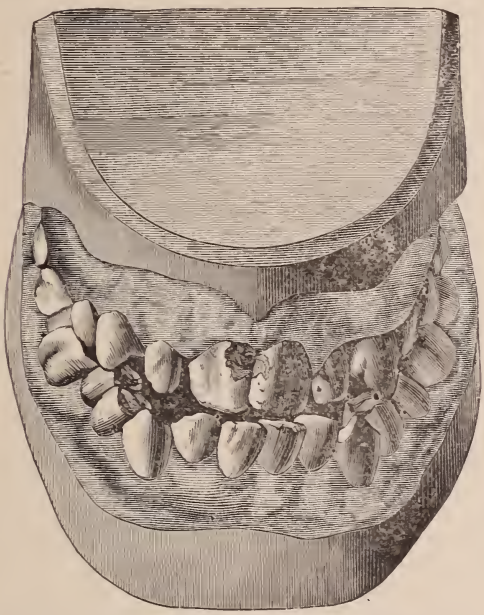


FIGURE. 4.—Front view of plaster casts representing the teeth of a boy aged seventeen (No. 61 of Dr. Sexton's collection).

Nervousness in children may frequenty be attributed to the condition of the teeth, especially during the act of second dentition.

It may be pardonable to suggest here that the management of the teeth is too often left to persons ignorant of the effects of retained pulpless teeth on the nerves, especially the fifth pair which transmits reflected irritation so frequently to the ear and other parts of the head; experience seems to point more and more to the fact that now-a-days too much attention is given to the retention and "treatment" of dead teeth, and that in by far the greater number of cases such teeth should be extracted.

[The cuts of the teeth above shown were furnished by the Bureau of Education, Washington; they are a part of those used in Circular No. 5, 1881, "on the causes of deafness among school children"].

THE EMPLOYMENT OF PEROXIDE OF HYDROGEN IN THE TREATMENT OF PURULENT INFLAMMATION OF THE EAR.

Dr. Sexton stated that he had employed this drug in both acute and chronic purulent inflammations of the middle ear with very satisfactory results. The medicine he had found to be an admirable substitute for other oxidizing agents employed in cleansing the ear. He had observed its action in a great many instances during the past year, both in private and hospital practice, but he is not prepared to present any notes of cases at this time.

The effect of the drug was to decompose purulent secretions. A few drops, may for this purpose, be instilled into the ear with a dropper, or it may be carried down with a little absorbent cotton wool attached to the end of a vulcanite probe. After remaining a minute or more the ear should be dried with cotton wool. The preparation of peroxide of hydrogen at present in the market is not chemically pure, but the impurities are not sufficient to interfere with its employment in the ear when diluted. The ordinary fifteen volume solution may be employed pure, if the case be not acute, but in the greater number of chronic cases, and always in acute ones where he has employed it, the strength has been more or less reduced by the addition of water. The preparation used was obtained from Messrs. Caswell, Hazard & Co., New York.

EXHIBITION OF INSTRUMENTS.

IMPROVED NOSE-PIECE FOR POLITZER'S BAG.

By Samuel Theobald, M. D., *Baltimore, Md.*

Dr. Samuel Theobald exhibited a conical, hard rubber nose-piece for Politzer's bag, which he had been in the habit of using for a number of years, and considered a great improvement upon the catheter-like tube originally employed by Politzer; also one of similar shape made of ivory for syphilitic cases. Nose-pieces of this form are used by many aurists, but as the bent tube of Politzer is still figured and recommended in most books upon the ear, he thought it worth while to exhibit them to the Society. The nose-piece of Politzer frequently causes pain and sometimes bleeding from the nose, whereas the use of the conically shaped one is attended by neither of these unpleasant consequences. The opening through the nose-piece should be large, so that when the bag is compressed the air may pass without obstruction into the nasal cavity.

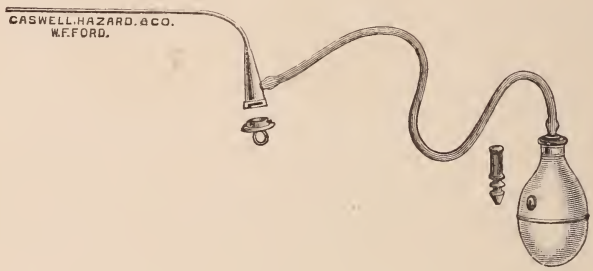
Dr. Prout says he never used anything else but a nose-piece of similar shape, but made of glass instead of bone.

AN INSTRUMENT FOR MAKING APPLICATIONS OF MEDICATED POWDERS TO THE MIDDLE EAR.

By J. A. Andrews, M. D., *New York.*

This instrument is a modified form of one exhibited to this Society three years ago. The receiver for the powder has been made much larger, being 3.75 ctm. ($1\frac{1}{2}$ inches) in length, and 1.5 ctm. ($\frac{5}{8}$ inch) in diameter at the base.

A mouth-piece may be substituted for the air-bag. The metal tube is 12.5 ctm. (5 inches) long, and No. 5 of the French scale. The advantage of having the tube constructed so delicately is self-evident. By the aid of the large goose-quill used by many for blowing powder into the middle ear, we may succeed in blowing powder into



the middle ear when there is no drum-head, but when the perforation in the latter is small, the powder is blown into the external auditory canal, against the drum-head and out again, but very little if any of the powder reaches the tympanic cavity. The tube of the instrument figured above is so small as to offer no more obstacle to the illumination of the external auditory canal than would be occasioned by the introduction of a knitting needle, so that its point may be conducted through an aural speculum, and under good illumination from a mirror on the forehead, to the perforation in the drum-head and the powder be blown into the middle ear.

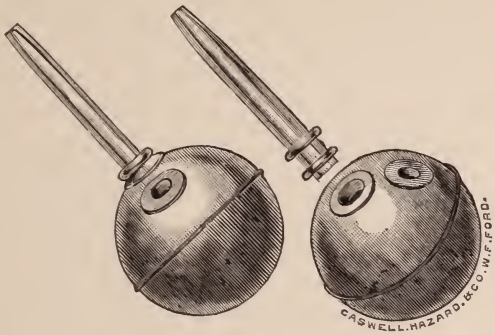
This instrument is made by Messrs. Ford, Caswell, Hazard & Co., New York.

Dr. Samuel Sexton showed an

AURAL POWDER INSUFFLATOR.

It consists of a glass tube, and a white rubber ball having

two holes (as in cut), one of them for attaching the tube,



the other to be closed by the tip of the forefinger when the ball is compressed for insufflation. The tube is held in its place in the ball by two rims near one end; it tapers slightly at the other.

For use the tube is charged by pressing it into the powder, which may be kept in a shallow wide-mouthed bottle partly filled with powder, the vent-hole in the ball being left open.

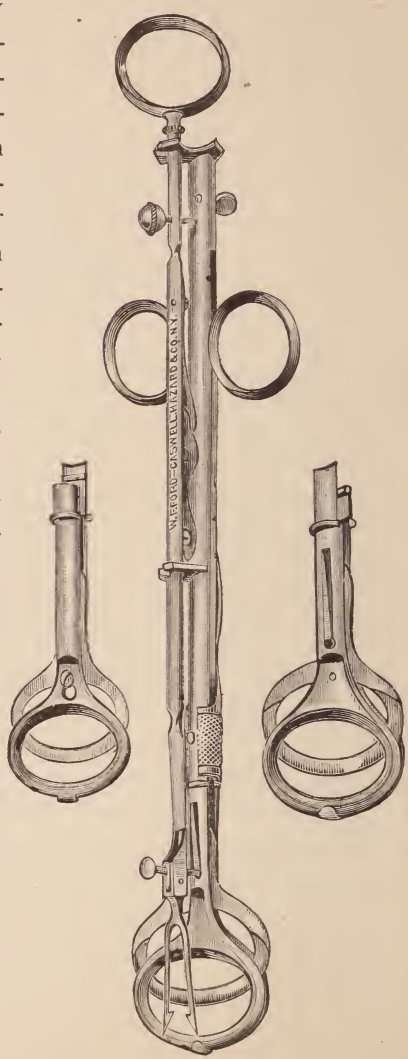
The forefinger closing the hole at the moment of compression, should be released immediately afterwards lest the suction should draw a portion of the powder, etc., back again into the ball. Care should be taken to keep the tube clean and dry, so that the powder may be ejected by the slightest compression of the ball. When using the instrument the patients ear should be up-turned and the auricle held back so as to open the canal. The cut shows the instrument about half the natural size. The insufflator is made by Mr. W. F. Ford of Messrs. Caswell, Hazard & Co., of New York.

Dr. Sexton also presented

A NEW TONSILLOTOME.

This instrument is constructed after the one invented by Mathieu, but seems to excel it in that it has different sized,

separable, adjustable sets of blade-rings, and that it can be more rapidly and easily taken to pieces for cleansing. Three sets of blade-rings go with the instrument, which have been found sufficient for ordinary cases; a special size for an extraordinary case can be made to order, thus constituting three or more tonsil guillotines in one instrument.



A.

The cut A represents about half the actual size, the tonsillotome, its two extra blades, in the position at the middle of the operation. The cut B shows the manner of attaching the blades.

As a tonsillotome it has the following special advantages: it may be used on either tonsil with either hand without readjustment of any of its parts; when in position, the long diameter of the fenestra is vertical, thus enabling us to include the whole tonsil in a single operation; the disance to which the tonsil is to be drawn by the spear through the fenestra of the blade-rings before amputation is regulated by turning the hinged-

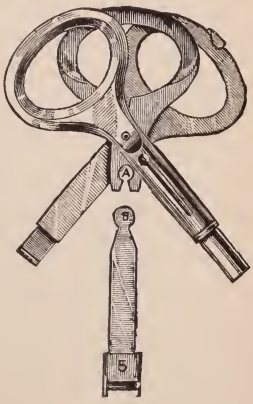
screw, behind the spear; and the separable blade-rings and facility of taking apart previously referred to.

In operating, the manipulation is the same as with Mathieu's, the instrument acting thus: When the thumb-ring and finger-rings are approximated, the spear first pierces the tonsil; the spear-shaft still sliding, the hinged-screw behind the spear engages with the blind end of its respective groove, turns on it as a centre, forces the spear-shaft away from the axis of the blade-rings,—thereby drawing the tonsil through the fenestra,—until the eccentric-pivot checks the screw's motion near the perpendicular; at this moment, a lever attached to the under surface near the hind end of the spear-shaft lifts the spring-catch which has held the blades in situ, when the finger-rings draw the cutting-blade, guillotining the tonsil, thereby completing the operation.

The instrument is taken to pieces in the following manner:

Remove the check-screw in front of the thumb-ring; draw back the spear-shaft, and it springs out of its slots.

Retract the milled-band behind the blade-rings; turn in their grooves, the superior and inferior blades of the guillotine, in *opposite* directions, until they are at a right angle to each other; the shaft easily comes out of its slot in the cutting-blade. The blades are now in the position represented by the cut. They will probably fall apart, almost automatically, as the superior is unclasped from the other two blades. The cutting portion of the instrument can now be cleansed and readjusted by retracing the preceding steps; or another set of blade-rings may be substituted and the instrument put together, as before. The plane surface of the blade-ring



B.

presents to the tonsil. The remainder of the instrument, after removal of the spear-shaft and blade-rings, is taken to pieces thus:

Slide the milled-band clear off the shaft; turn the flat thumb-screw under the hind end of the shaft; this releases the lower half of the main shaft, and the shaft of the cutting-blade of which the finger rings are a part.

Rëadjustment is made by reversing the process just described.

It is manufactured by Mr. Ford, of Messrs. Caswell, Hazard & Co., of New York.

NOTICE.

The committee to take in consideration the request of the Convention of Teachers of Deaf-mutes by the Oral Method, held in New York City on June 25th to 28th, consists of Dr. Chas. H. Burnett, of Philadelphia, Pa., President of the American Otological Society, as chairman; Dr. F. B. Loring, of Washington, D. C., and Dr. Samuel Sexton, of New York, N. Y.

J. J. B. V.

TRANSACTIONS

OF THE

AMERICAN OTOLOGICAL SOCIETY,

EIGHTEENTH ANNUAL MEETING.

Pequot House, New London, Conn., July 14, 1885.

VOL. 3, PART 4.

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CORRECTION.

Page 332, twenty-first line, for Dr. S. O. Ritchie read Dr. S. O. Richey.

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OF THE

AMERICAN OTOLOGICAL SOCIETY.

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Dr. E. Williams . . . . . Cincinnati, O.

American Otological Society.

The Eighteenth Annual Meeting of the American Otological Society was held at the Pequot House, New London, Conn., on Tuesday, July 14th, 1885. The Society was called to order at 10 A. M., by the President, Dr. C. H. Burnett, of Philadelphia, Pa.

The following members were present:—

Drs. C. R. Agnew	New York, N. Y.
J. A. Andrews	New York, N. Y.
Gorham Bacon	New York, N. Y.
E. W. Bartlett	Milwaukee, Wis.
C. J. Blake	Boston, Mass.
C. H. Burnett	Philadelphia, Pa.
W. H. Carmalt	New Haven, Conn.
E. Dyer	Newport, R. I.
B. E. Fryer	Kansas City, Mo.
J. Green	St. Louis, Mo.
J. O. Green	Boston, Mass.
E. E. Holt	Portland, Me.
Lucien Howe	Buffalo, N. Y.
C. J. Kipp	Newark, N. J.
H. Knapp	New York, N. Y.

C. S. Merrill	Albany, N. Y.
H. G. Miller	Providence, R. I.
O. D. Pomeroy	New York, N. Y.
J. S. Prout	Brooklyn, N. Y.
D. B. St. John Roosa	New York, N. Y.
W. W. Seely	Cincinnati, O.
S. Sexton	New York, N. Y.
S. B. St. John	Hartford, Conn.
S. Theobald	Baltimore, Md.
J. J. B. Vermyne	New Bedford, Mass.
D. Webster	New York, N. Y.
E. Williams	Cincinnati, O.

Honorary Member:—

Prof. A. Graham Bell	Washington, D. C.

And by invitation:—

Drs. J. O. Tansley	New York, N. Y.
F. N. Otis	New York, N. Y.
L. Fisher	New York, N. Y.
L. Webster Fox	Philadelphia, Pa.
W. Appleton	Boston, Mass.
L. Dixon	Boston, Mass.

The President appointed as the Business Committee Drs. C. J. Blake, D. B. St. John Roosa and E. W. Bartlett, and in the absence of Dr. H. D. Noyes, who was appointed on the Committee on Membership at the last meeting, Dr. J. O. Green was added to that Committee.

The Treasurer's report was read and referred to Dr. C. J. Kipp as Auditing Committee. This Committee stated the report to be correct and the accounts properly vouched for, and the report was then accepted.

The President gave notice that since the last Annual Meeting the Society had lost by death two of its members, nl., Dr. John H. Dix, of Boston, Mass., died August 25, 1884, date of membership 1868, and Dr. E. T. Ely of New York, N. Y., died April 12, 1885, date of membership 1880.

The Committee appointed at the last Annual Meeting to take in consideration the request of the Convention of Teachers of Deaf-Mutes by the Oral Method, held in New York City on June 25th to 28th, and consisting of Drs. C. H. Burnett, F. B. Loring and S. Sexton reported progress and asked to be continued, which was granted.

The Business Committee reported the bulletin of communications to be presented at the meeting in the following order:

1. Dr. S. Sexton, of New York, N. Y. On Inflammation of the Attic of the Tympanum.

Discussed by Drs. Roosa, Andrews, Pomeroy, Webster, Agnew, Kipp, Theobald, Blake, J. O. Green, Williams and Knapp.

2. Dr. W. W. Seely of Cincinnati, O. Treatment of Chronic Otitis Media; and

3. Dr. C. H. Burnett, of Philadelphia, Pa. On the Relation between Chronic Catarrhal Rhinitis and Chronic Catarrhal Otitis Media.

The papers of Drs. Seely and Burnett were discussed by Drs. Pomeroy, Agnew, Roosa, Williams, Howe, Knapp, Kipp and Andrews.

After the reading of these papers, on motion of Dr. Agnew, the Secretary was instructed to give to the gentlemen, who had taken part in the discussions of this meeting, the manuscript of their remarks as made in the current discussion within ten days.

At 1.45 P. M., the Society went into Executive Session, and at 2.30 P. M., adjourned till 4 P. M.

Afternoon Session.

The Society was called to order at 4 P. M.

4. Dr. S. Sexton, of New York, N. Y., presented and explained a conversation-tube for the Aural Instruction of Deaf-Mutes.

5. Prof. A. Graham Bell, of Washington, D. C., honorary member of the Society, addressed the Society with regard to the large number of Deaf-Mutes in the Institutions for Deaf-Mutes, that could yet hear to a certain degree, and therefore were simply hard-of-hearing members of society, also to the possibility of educating the hearing power in these persons and recommended the subject to the consideration of the Members of the American Otological Society.

Prof. Bell's remarks were discussed by Drs. Pomeroy, Roosa, Burnett, Howe, Williams, Sexton, Theobald, Knapp and Seely.

6. Dr. C. J. Kipp, of Newark, N. J., exhibited Retzius work on the Anatomy of the Organ of Hearing of the Vertebrate Animals.

7. Dr. C. J. Kipp reported A Case of Fatal Ear-disease, beginning with Circumscribed Inflammation of the External Canal.

Discussed by Drs. Pomeroy, Theobald, Roosa, Sexton, J. O. Green, Andrews, Fryer and Burnett.

8. Dr. E. E. Holt, of Portland, Me., reported on the "Present Condition of the Patient from whom the Teratoid Tumors were removed," reported two years ago.

9. Dr. C. H. Burnett, of Philadelphia, Pa., read a paper on: Some Experiences with the Use of the Sulphate and the Hydrochlorate of Cocaine and of Brucine in the Diseases of the Ear; and

10. Dr. E. E. Holt, of Portland, Me., a paper entitled: "Does Cocaine Hydrochlorate while relieving the pain in Acute Otitis Media, prolong the Congestion?"

Discussed by Drs. Theobald, J. O. Green, Fryer, Webster, Pomeroy and Howe.

At 6.15 P. M., adjourned till 8.30 P. M.

Evening Session.

The Society was called to order at 8.30 p. m.

The records of the two previous sessions were read and accepted.

11. A paper by Dr. S. Sexton, of New York, N. Y., on Two Cases of Neglected Eardisease in Infants, resulting in Death, was read by title.

12. Dr. H. Knapp, of New York, N. Y., read a paper on The Desirability of Adopting a Uniform Method of Expressing the Results of Examinations of the Acuteness of Hearing.

Discussed by Drs. Roosa, Prout, J. O. Green, Howe, Theobald, J. Green, Sexton and Bartlett.

Dr. Roosa moves that Dr. Knapp be requested to present the proposed system of recording the hearing to the meeting of German Naturalists at Strasbourg next year. Adopted.

Dr. J. O. Green moves that a committee be appointed, composed of Drs. Knapp, Roosa and Prout, to report in 1886 on a uniform system of recording the hearing power. Adopted.

13. Dr. Roosa presented a paper on Presbykousis.

Discussed by Drs. Sexton, Theobald, Knapp, J. O. Green, Holt and Williams.

14. Dr. O. D. Pomeroy, of New York, N. Y. A case of Chronic Otitis Media Suppurativa, resulting in Cerebellar Abscess, with the Autopsy. Read by title.

15. Dr. G. Bacon, New York, N. Y. Otitis Media Suppurativa, Mastoid Disease and Pyæmia. Mastoid operation. Recovery. Read by title.

16. Dr. E. Dyer, of Newport, R. I., verbally presented a case of Fistula Auris Externa Congenita.

Discussed by Drs. Knapp, J. O. Green, Burnett, Sexton and Kipp.

17. Dr. S. Sexton exhibited a new glass Earsyringe and an Earpincet with several attachments.

After the reading of these different papers the Society went into executive session.

On the favorable recommendation of the Committee on Membership,

Dr. Franklin P. Capron, of Providence, R. I.,

was elected a member of the Society by ballot.

An offer of Dr. Gorham Bacon for himself and Dr. C. J. Blake, that a complete Bibliographical Index on Otological subjects for the last two years, by them compiled, be printed in the transactions, was referred to the Publishing Committee with power to act.

The following amendment to the constitution was offered and adopted:

To add to III, Members, the following paragraph: "Candidates for membership shall have been engaged in the practice of Aural surgery for at least five years, shall have given evidence of satisfactory scientific attainments, and shall have conducted themselves in conformity with the ethical rules of this Society."

The following officers were elected for the ensuing year:

President	Dr. J. S. Prout, of Brooklyn, N. Y.
Vice President	Dr. S. Sexton, of New York, N. Y.
Secretary and Treasurer	Dr. J. J. B. Vermyne, of New Bedford, Mass.
Committee on Membership:	Dr. W. H. Carmalt, New Haven, Conn. Dr. C. J. Kipp, Newark, N. J. Dr. S. Theobald, Baltimore, Md.
Committee on Publications:	Dr. J. J. B. Vermyne, New Bedford, Mass. Dr. C. J. Blake, Boston, Mass. Dr. J. O. Green, Boston, Mass.

A unanimous vote of thanks was passed to Dr. C. H. Burnett, of Philadelphia, Pa., the retiring President, for his services in the chair.

The Society resolved as usual to meet for the next Annual Meeting the day before the Annual Meeting of the American Ophthalmological Society, and at the same place.

At 11.45 P. M., adjourned.

J. J. B. VERMYNE,
Secretary.

THE LOCAL USE OF COCAINE AND BRUCINE IN DISEASES OF THE EAR.

By Charles H. Burnett, M. D., *Philadelphia.*

My experiences with Cocaine have been somewhat peculiar. My first trials were made with the sulphate of cocaine, manufactured in Philadelphia, and which, in the hands of others, had proved entirely efficient in the production of anæsthesia in the eye and upon the lips. My experiences with this same sulphate of cocaine were limited to the ear. I failed to produce with it anæsthesia in a case of acute inflammation in the tympanic cavity, and in the periosteum of the fundus of the auditory canal, in an ear previously diseased by chronic purulent otitis media. In this case, in which there was intense pain in the ear and mastoid region, I made repeated trials with the sulphate of cocaine, but could not see that I reduced the pain in the slightest degree.

In some cases of otitis externa circumscripta, I endeavored to induce local anæsthesia in the meatus preparatory to incision of the abscess, but the results were not worthy of regard, excepting negatively. The failure to produce anæsthesia in the first case may be attributed to the density of the periosteal and mucous tissues, caused by the chronic purulent disease, and in the cases of furuncular abscess in the external meatus, to the density of the skin in this region.

Upon using the hydrochlorate of cocaine as a local anæsthetic in painful affections of the ear, my results in

producing local anæsthesia in the ear have been more satisfactory, but only because, as I think, I have employed this latter preparation in cases characterized by less severe pain than those in which I had used the sulphate. I had long suspected that some of the asserted results in easing pain, attributed to the solution of the drug when warmed and instilled into the ear, were really attributable to the warmth, and that, therefore, it was no more efficient than warm water, which, as everyone knows, will often ease ear-ache of a mild character. I therefore used the solution of the hydrochlorate of cocaine without warming it.

In cases of not excessive congestion of the skin of the fundus, and of the membrana flaccida of the drum, as found in acute coryza and attended by some pain, but not of a continuous or intense variety, the hydrochlorate of cocaine in four per cent. solution, applied, not warmed, by mopping it gently upon the inflamed region by means of cotton on the cotton-holder, under perfect illumination by the forehead mirror, has seemed to check the pain; but only in cases with the superficial congestion of the thin tissues described. As for producing local anæsthesia in the auditory canal, profound enough to permit painless incisions into the lining skin, it is not competent to do it. And local anæsthesia in the membrana tympani, preparatory to paracentesis of this membrane, is not required, as the operation is not painful, or not enough so to demand local anæsthesia.

It seems probable that Brucine, either in solutions of the alkaloid or of the nitrate or the sulphate has a useful future in the treatment of pain in the ear, due to inflammation of the skin in the meatus and auditory canal, and in the acute inflammations in chronically inflamed periosteal and mucous tissues of the fundus of the canal and the tympanic cavity.

Dr. Thos. J. Mays, of the Philadelphia Polyclinic, in the Therapeutic Gazette for June, 1885, calls attention to

the local action of brucine in producing anæsthesia especially in cutaneous tissues. He says that "the benumbing action of brucine on mucous membrane in health is not so prompt as that of cocaine in the same strength. It is, however, on the cutaneous surface where its action is most decided and definite. This is best demonstrated by applying it (in solutions of 5–20 per cent.) to the hairy part of the hand or arm, and allowing it to remain for ten or fifteen minutes, and then comparing the sensibility of the skin thus treated with a neighboring one by pulling out the hair."

He also allayed pronounced cutaneous pruritus, by the application of it in 5 per cent. solution. To obtain a full anæsthetic property of brucine great care must be exercised to obtain an article free from strychnine, an object not easily attained. It is useless as an anæsthetic, and even dangerous in its application if thus contaminated. Even the purest brucine may not be entirely free from danger from its retained strychnine. The solution is easily applied with a small sponge or camel's hair pencil to the skin surfaces, ten to fifteen drops being employed, beginning with the weaker solution. If this fails, a stronger may be used. The effects become visible in from five to ten minutes.

Dr. Mays very kindly gave me an ounce or two of the 5 per cent. solution, and I have tried it in the Polyclinic in three cases, and my assistant, Dr. Seiss, has tried it in one case in private. The solution of the alkaloid was acidulated with hydrochloric acid in the proportion of five drops to the gramme. The applications have been made to alleviate ear pain chiefly in acutely inflamed auditory canals and tympanic cavities, in chronic purulent disease. In one instance it was applied to relieve pain in the fundus of a canal, once the seat of chronic ulceration. In all four cases relief to pain has been complete and prompt, the result far in excess of anything yet obtained in the ear by hydrochlorate of cocaine.

DOES COCAINE HYDROCHLORATE WHILE RELIEVING THE PAIN IN ACUTE OTITIS MEDIA, PROLONG THE CONGESTION?

By E. Eugene Holt, M. D., *Portland, Maine.*

This question has occurred to me in several instances this spring, where I had used a solution of the cocaine by instillation per meatus, for relief of pain, incident to acute inflammation of the middle ear, and I thought it worthy of the attention of the society that members might give their personal experience bearing upon the subject. In considering this subject I am aware, and have assumed, that at least in my section of the country we have sustained an unusual severe form of acute inflammation of the mucous membrane of the throat and passages connected therewith. Allowing this to be the fact, and at the same time comparing the results of treatment by instillation of a solution of the cocaine with the application of the leech in times past and also this season, other auxiliary treatment being the same, I am persuaded that while the cocaine relieves the pain when used early and repeatedly, it, at the same time, holds the inflammation, as it were, in check, which, when the effects of the drug subside, goes on in a more or less passive state, now and then lighting up anew, with twinging pains, keeping the mucous membrane in a congested swollen condition, interfering with the conducting part of the ear, and thereby prolonging the deafness. I will not go into details of cases to substantiate this impression made by the employment of cocaine, nor will I attempt

to explain the *modus operandi* of its action on the ear. So far as I have been able to observe its effect on the eye I have not yet arrived at the same conclusion, but the conditions are somewhat different, since in the ear we have in inflammation of the tympanum, practically a closed cavity.

DISCUSSION.

Dr. Samuel Theobald, Baltimore: — I would say in this connection that the effect of cocaine in the treatment of nasal affections was recently discussed in our State Society, and the opinion was expressed very decidedly by some of the speakers, that although its effects in reducing swelling of the mucous membrane of the nose are pronounced, they are evanescent, and the tissues return quickly to their previous condition. Dr. John Mackenzie was disposed to think that in the treatment of these conditions its influence for good was very transient, and that the anæmia which it induces is soon followed by a passive congestion as great as before its use.

Dr. J. Orne Green, Boston: — Soon after this drug was introduced, Dr. H. L. Morse reported the case of a child suffering with ear-ache in which he used cocaine. The effect was so marked that I was led to try it. The case was seen early and the cocaine was passed over the mouth of the Eustachian tube. The child was ten years old and the relief was instantaneous — certainly within one minute. The cries entirely ceased and the child exclaimed: "What relief!" He made two or three applications in the course of forty-eight hours. The congestion passed away and the inflammation disappeared. That was the first case that I had heard of, in which it had been used in that way. I have used it in the same class of cases and great temporary relief follows the application, but I did not find that it made the slightest difference in the inflam-

mation, and I am now satisfied that the case of Dr. Morse was one of those of sudden congestion which rapidly disappears. While cocaine relieves the pain of true inflammation speedily, it is apt to return in a short time. An interesting fact is the action of cocaine in contracting the blood vessels. The relief in these cases seems to show that a good deal of the pain is due to closure of the Eustachian tube.

It seems to me that where you have to operate on a superficial surface which is absorbent and you can get the cocaine over the whole surface and the operation is not going beyond the surface, cocaine is a useful anæsthetic. In the majority of cases of operation on polypi, the solution can not be applied to the entire surface. In paracentesis, it is applied only to the external surface and does not affect the inner layer of the membrane. I have tried it in nasal polypi, but have not been able to get it over the whole surface in sufficient quantity to dull the sensibility of the whole mass.

I would state that the solution that I have employed has been a two or four per cent. solution of the hydrochlorate.

Dr. B. E. Fryer, Kansas City: — I would ask, Mr. President, if the writer or any other of the gentlemen have used the *oleate* of cocaine?

Dr. Burnett: — I have not.

Dr. David Webster, New York: — I have used cocaine in some cases of ear disease. I did one case of paracentesis of the drum-membrane with it. I put half a dozen drops of a four per cent. solution of the hydrochlorate into the ear with the auditory canal vertical, so as to keep the cocaine in contact with the drum. The head was kept in this position for ten or fifteen minutes. I then let it escape and punctured the drum-membrane. The patient felt it, but said that it hurt very little. It was a case of chronic aural catarrh with tinnitus and probably the opera-

tion would have hurt very little without the cocaine. I have removed an aural polypus under its influence and there it was completely successful. This was in the case of a very nervous young lady and the cocaine not only prevented the pain entirely. but it seemed to shrink the polypus and harden it, so that I was able to remove it more easily than if I had not used the remedy.

I have tried to relieve the pain of acute otitis media with it, but have almost entirely failed. In one or two cases the patients thought that the pain was somewhat relieved, but the relief was not sufficient to encourage me to use it in such cases. I think that I have heard some of my colleagues say that it would relieve the pain temporarily if there was perforation of the drum. Almost invariably if there were no perforation, it did not relieve the pain. I think that it does the inflammation no good. Although it may temporarily contract the walls of the blood vessels, the reaction perhaps leaves the inflammation worse than before. I have heard several say that they remove aural polypi successfully with cocaine.

Dr. Charles H. Burnett, Philadelphia:—Is the sensibility of aural polypi such as to demand an anæsthetic?

Dr. David Webster:—It has been my experience that patients have tolerated operations for the removal of polypi, badly. In trying to get the snare around the polypus or to take hold of it with the forceps, the patient does not keep still.

Dr. Oren D. Pomeroy, New York:—I have a strong impression that the removal of polypi is quite painful. That has been my experience almost always. I believe that in a certain number of cases, cocaine relieves this more or less, sometimes less. If a pledget of cotton is saturated with the solution of cocaine and laid on the part for some minutes, it is more effective than when applied by instillation. In the throat department of the Manhattan

Eye and Ear Hospital, in making cauterizing applications to the nares or in the removal of polypi, a pledget of absorbent cotton saturated with the cocaine solution is passed into the nostril and allowed to remain for ten minutes. This will so paralyze the sensibility as to allow of the almost painless removal of polypi and the cauterization of the parts. I lay considerable stress on saturating cotton and laying it on the part, and perhaps rubbing it in with a little violence. I believe that one objection to the use of cocaine in the removal of nasal polypi is, that while the hemorrhage in the first instance is arrested, subsequently there is apt to be more hemorrhage than without cocaine, and in some instances this may be dangerous.

Contrary to what Dr. Burnett has said, I think that it would be desirable to have some agent which would diminish the pain from puncturing the drum-membrane. This operation is more or less painful; sometimes, however, it is scarcely painful at all, but it is not a pleasant operation. I have not had much success in relieving the pain from puncturing the drum-membrane by the use of cocaine. If I had applied the cocaine on cotton, I think that I should have been more successful.

As far as I have observed, the oleate of cocaine is more successful on cutaneous surfaces than any aqueous solution. The drum-membrane, however, seems to absorb even this badly.

As to the effect of cocaine on inflammation, I think that it is bad rather than good.

Dr. E. E. Holt, Portland, Me.: — The laity are about as well versed in the use of cocaine as the medical profession, and in acute inflammations of the middle ear, they want cocaine tried. Applications of it almost invariably relieve the pain, but it recurs and it seemed to me that the inflammation of the tympanum was more severe and that the deafness lingered and did not clear up. The

point is whether it is good treatment to use this, or whether it is better to insist on the use of leeches, hot water and other treatment.

Dr. Lucien Howe, Buffalo: — Perhaps it may be of interest if I call attention to this collection of the leaves of the coca plant, showing its different varieties. A great deal depends on the plant from which the extract is made and much depends upon different forms of preparation.

(A number of the leaves was then exhibited.)

ON THE DESIRABILITY OF ADOPTING A UNIFORM METHOD OF EXPRESSING THE RESULTS OF TESTING THE ACUTENESS OF HEARING.

By H. Knapp, *of New York.*

A recent and very excellent paper of Bezold, published in the last number of the *Zeitschr. für Ohrenheilkunde* (the German edition of the Archives of Otology) shows that a uniform method of expressing the results of the functional examination of the organ of hearing has not yet been arrived at; it shows, at the same time, how desirable it would be to have a proper method universally used. Bezold publishes the results of his extensive and thorough examinations of the hearing power of school-children. After discussing the advantages and disadvantages of the watch and of Politzer's hammer as acoumeters, he gives it as his opinion that the ordinary speech, and still more, the whispered voice, are the best hearing tests at present at our command. In his examinations he used the whispered voice almost exclusively, and in tabulating the results obtained, he divides the degrees of hearing acuteness into four classes. The first class of pupils were those that could hear his whisper at 16 meters and farther, the second those that could hear it from 8 to 16 meters, the third those from 4 to 8 and the fourth from 0 to 4 meters. He considers the hearing of the first two classes good enough for all purposes, and, therefore, calls it normal, whereas that of the last two classes is called defective.

I have a high respect for Bezold's merits in aural surgery, but regret that in this particular case, he omitted to examine the school-children with the watch or Politzer's hammer. Using the voice alone as a hearing test is, in my opinion, insufficient for a correct estimate of a patient's hearing. We would in many cases fail to detect the beginning of deafness, that stage in which treatment is more important and more successful than in the later stages. How often do patients come to us complaining only of tinnitus aurium, saying that their hearing is as good as it can be. If we test them with the voice, even in all the variations voice is capable of, they come up to the normal standard. If we test them with a watch they, almost without exception, fall considerably short. I have seen such exceptions, especially in young ladies, that complained of noises for years, but neither the functional nor physical examination discovered any other abnormity. The hearing power, for all tests, was not only normal, but better than the average. In several years the noises disappeared, and the hearing acuteness had not suffered. The tinnitus, in such cases, may be considered due to hyperæsthesia of the acoustic nerve.

Dr. Bezold states that his whispering is heard as far as the tick of Politzer's hammer, and that whispering, if compared with an instrument of constant loudness, can be made a uniform hearing test. This, gentlemen, is a fallacy, if it means that the two tests are interchangeable; for, in patients at least, there is, as everybody knows, nothing nearly like a constant proportion between the reduction of hearing the watch and that of hearing speech. This disproportion may not, probably does not, exist to the same extent in healthy ears, but must never be disregarded in diseased ears, as Bezold has done in omitting the test with the watch, except in one series of examinations. This series also shows the discrepance between the watch and

the speech tests. Had Bezold made as extensive examinations with the watch as with the voice, it is most likely that the 20% of defective hearing organs which he found among school children would have been not immaterially raised. As I have said, by omitting to test the hearing power with the watch, we fail to detect just the beginning period of deafness.

The desirability of having a uniform acoumeter has, of course, been felt as long as examinations of audition have been made and recorded. Politzer's hammer is, indeed, an acoumeter that has, as far as I have compared different instruments, both of European and American make, the same intensity and quality of sound. But, as Dr. Roosa correctly remarks in the newest edition of his textbook, it has no advantage over the watch. I may add that it suffers from a capital disadvantage on account of which it will never be generally adopted, not even extensively used, by any one, viz.: it is inconvenient, its hearing distance, 15 meters, being too great. Many aurists have such an instrument on their desk, but they do not use it regularly, because, travelling constantly through a space of 50′, is much too troublesome, even if every one had so much space at his command. We must find acoumeters that we can use in our consultation rooms, say in a space of 20′ to 25′ in length. Even with less we can get along, though it is not desirable. With due regard to these limitations of space and loudness of sound on the one hand, and the necessity of examining the hearing power for noises, as well as for tones, *we cannot make an examination that is sufficient for practical purposes, without using both the watch and the voice.* This is the minimum of accuracy required, but it is sufficient in the great majority of the cases that come before us. In particular cases it is desirable to examine how a patient perceives high and low tones, for which purpose a piano and König's rods are

indispensable. Besides that, the tuning fork is needed in very many cases. But these tests, gentlemen, I may leave out of consideration, for their results have, for the present at least, to be expressed in unabridged and common language.

To denote different degrees of hardness of hearing as tested by the watch and the voice, I know of no better mode than that introduced by Dr. Prout and myself 13 years ago, namely, to express them as fractions of the normal standard, as oculists express degrees of impairment of sight. With regard to the watch, every aurist has to determine for himself, by examining a number of normal-hearing persons in middle life, how far his watch can be heard, of course under the well known precautions. The average of these tests will constitute the hearing distance of his watch. My watch can be heard at 24″, normal hearing would be expressed by $h=\frac{24}{24''}$. With regard to whispering, I have found that, if I whisper without any strain or raising my voice, sentences or words, which the person examined does not expect, are understood at a distance of 20.′ I, therefore, express normal hearing of the whispered voice by $v=\frac{20}{20'}$. Bezold says that his whisper is heard by normal ears at 16 meters and more. I think this could not be without raising the voice or using words which the pupils expected. If ordinary conversation is declared to constitute the best hearing test, I do not think that any society of persons with the best hearing organs could keep up a conversation in whispers at a table 50′ long; they could not even do it with ordinary speech, if there was the least noise. But suppose the rooms in which we examine patients are quiet, then ordinary conversational voice will, as a rule, not be heard farther than about 60′. This I have tried over and over again and, therefore, put $v=\frac{60}{60'}$ as the normal standard of hearing conversational speech. Each examiner has, of course, to adapt the loudness of his whis-

per and speech to the size and the quietness of the rooms that are at his command. It is not necessary to express whisper by S, meaning susurrus, for the denominator of the fraction, 20′, expresses sufficiently what is meant. If v stands for voice in general, everybody will at once see that $v=\frac{10}{20'}$ signifies that the patient hears at the distance of 10′ a voice that should be heard at 20′; $v=\frac{20}{60'}$, a voice that should be heard at 60′ is heard only at 20. Any letters as P. A.=potentia auditus, and the like, are superfluous, for the above equations, which are purposely left unreduced, indicate the acoumeter as well as the manner and result of the examination. Right or left ear may in English and German writing be expressed by the capitals R and L, or if any one prefers the Latin, by A. D. and A. S., auris dextra, auris sinistra.

So far as this goes I think we here in America, are all more or less used to this mode of recording the acuteness of hearing.

Some peculiarities are still to be noted, on which it would be very desirable that we should agree. I mean we may adopt the same symbols for expressions, as: watch of 24″ hearing distance heard on application to the mastoid, the temple, the forehead, etc. In order to be brief, I submit to your consideration, amendation and adoption, the following list:

$h=\frac{24}{24''}$=normal audition for the watch.
$v=\frac{20}{20'}$=n. h. for whispered voice.
$v=\frac{60}{60'}$=n. h. for conversational speech.
$v=\frac{20'}{\infty}$ } whisper or speech heard, but not understood, *i. e.*
$v=\frac{60'}{\infty}$ } quantitative perception of sound.
$v60'=0$=voice not heard at all. $H=Aud.$ (auditus) =0, complete deafness for all sounds.
$h=\frac{c}{24''}$=a watch of 24″ hearing distance is heard when applied to (on contact with) the ear.

$h = \frac{pr}{24''}$ = a watch of 24″ hearing distance heard when pressed on the ear.

These two distinctions, which I take from Roosa's text-book, should be made, as it is quite a different thing when the watch is only applied to the ear, or firmly pressed against it.

$h = \frac{m}{24''}$ = watch of 24″ h. distance heard when applied to the mastoid.

$h = \frac{t}{24''}$ = watch of 24″ h. distance heard when applied to the temple.

$h = \frac{d}{24''}$ = watch of 24″ h. distance heard when applied to the teeth.

$h = \frac{gl}{24''}$ = watch of 24″ h. distance heard when applied to the forehead (glabella.)

$h = \frac{v}{24''}$ = watch of 24″ h. distance heard when applied to the vertex.

$h = \frac{ub}{24''}$ = watch of 24″ h. distance heard when applied everywhere (ubique).

These symbols would also signify that bone conduction for the watch is preserved in the places indicated.

One thing only is to be added and that is that the watch is not heard from the places indicated in these abbreviations. In this case I would write them as follows:

$h \frac{e}{24''} = 0$;

$h \frac{m}{24''} = 0$, etc., which means that a watch of 24″ hearing distance is not heard when in contact with the ear, not when applied to the mastoid, etc.

$h \frac{nh}{24''} = 0$, means that the watch is heard from no part of the head, in other words that bone conduction for the watch is lost.

Gentlemen, this is the simplest mode of expressing by short symbols what we have constantly to enter in our case-books, what we have to write to each other, what we have to print. I am not particular that just these abbreviations should be introduced, I shall be happy in accepting any other that is equally or more simple and explicit, but I think it is highly desirable that we should unite in adopting a common system of notation. If such a union could, as I trust, be obtained, I would in the otological section of the next meeting of the Society of German Naturalists and Physicians at Strasbourg, propose its adoption to our German brother-aurists, and I hope it will become as universal as the use of Snellen's method of examining and expressing the acuteness of vision. In countries in which the metrical system is in use, and by all those that prefer it, the above values in inches and feet can be easily converted into decimeters and meters.

DISCUSSION.

Dr. D. B. St. John Roosa, New York:—The importance of this subject impresses all of us. In the reading of the system, it seems to include all that has been profitably used for testing the hearing, and I have no criticism to make. If the Society thinks as well of it as some of us do, I think it would be well to ask Dr. Knapp to introduce what has become the American System at the meeting of German Naturalists and Physicians of which he speaks.

I would move that Dr. Knapp be appointed a committee to present the subject of a uniform system of expressing the results of examinations for the acuteness of hearing, before the German Society of Naturalists and Physicians, on behalf of the American Otological Society.

Dr. Samuel Theobald:—Does Dr. Knapp provide only for the whispered voice?

Dr. Knapp: — No, sir. I said that it was not necessary to indicate it by special letters. The denominator indicates that the words were spoken in a whispered voice.

Dr. John Green, St. Louis: — If I understand correctly the whispered voice is defined by the denominator 20, while in the case of the watch, the denominator is 24. This might cause confusion.

Dr. Knapp: — That is only my watch. Other watches are of course different.

Dr. Lucien Howe: — In order to obviate the difficulty which might occur, would it not be well to use the metric system, especially if we expect it to assume an international character?

Dr. H. Knapp: — The metric system could be adopted and it will undoubtedly be in other countries, but there could be no ambiguity about the voice and the watch, for the watch is indicated by the letter H, while the voice is indicated by the letter V. I would make the point that the vocal sound is quite a different kind of a test from the whispered word. It seems to me that it is different.

Dr. Samuel Theobald: — Many patients distinguish words spoken in a whisper better than when they are spoken in a low tone of voice. I have noticed this in a number of cases.

Dr. J. Orne Green: — There is one point which I did not hear alluded to and that is the reinforcement of the sound on one side more than on the other. I always want to put down in which ear the tuning fork is heard the loudest. I test this by three forks, the middle C, the next C, and the next highest A. I have indicated the ear by the letters R and L.

Dr. H. Knapp: — My proposition is only a first approximation to the subject. Other tests may be worked out. In European publications there is no system of notation. I have worked out the examination for noises and the voice,

because I consider these two hearing tests indispensable. Formerly I examined also with a music box, but this is superfluous.

Dr. J. O. Green:—I hope that the subject will be carried farther.

Dr. Samuel Sexton, New York:—I should be much interested in hearing the experience of some of the members in regard to testing the power of hearing. I have made many examinations with the tuning fork and König's rods, but nowadays I employ these methods less and less. I regard the voice even like other tests as often unreliable. I do not think we gain much by the use of high-pitched sounds. Practically we want to know how well the patient hears the voice.

I should like to ask Dr. Knapp, if in referring to hyperæsthesia did he mean that patients heard more than normal?

Dr. H. Knapp:—I meant that the acoustic nerve was in a condition of excitation, bringing out some of its functions without any disease. In some cases there is tinnitus aurium without its being a precursor of deafness. These cases are nervous. I have cases in which this disappeared, leaving the hearing as good as normal. Especially is this true in nervous ladies.

Dr. E. W. Bartlett, Milwaukee:—I fully endorse the suggestions of Dr. Knapp and use this system in part in making examinations. I ask the patients to repeat the words I use. The difference in hearing words is very great. Some words are heard better than others. Some ten years ago, a German wrote a paper on this subject giving a number of words. It was published, I think, in the Otological Journal. Dr. Blake also published a paper of this sort. If we are to adopt something of this sort, it seems necessary that the words should be selected, for such words as chair, horse and house are heard three times as far as time and tear. If the latter words are used one

day and the following day the former words, the case will improve quite rapidly. If certain words could be chosen with their distance, we should have surer method of testing the hearing than by leaving the matter in the shape that Dr. Knapp has done.

Dr. H. Knapp: — Dr. Sexton thinks that the watch is not necessary in examining the hearing power. One point that I wanted to make was that the watch or some instrument for testing noises was necessary, because it reveals the beginning of the failure of hearing.

With regard to Dr. Bartlett's remarks; if we adopt a series of words or phrases, these will soon be familiar to our patients. We must vary the phrases. As has been said, some words are heard much better than others, a fact which every aurist takes into account.

Dr. C. R. Agnew, New York: — When I hear it said that a whisper is heard at a certain number of feet, it conveys no definite idea to my mind. The whisper is not a definite sound and has not been measured.

Dr. H. Knapp: — I said that every one must determine this by his personal experience. As our voices are not equal and our rooms not the same, each one must make a sufficient number of examinations.

Dr. Samuel Sexton: — Did Dr. Knapp say that the loss of the ability to hear high-pitched sounds was a sign of beginning deafness?

Dr. H. Knapp: — I said that when deafness begins the first sign is the loss of the faculty of hearing noises, such as Politzer's hammer or the watch.

Dr. Sexton: — I supposed you meant any kind of a noise.

Dr. D. B. St. John Roosa: — I would withdraw my previous motion and move that Dr. Knapp be requested to present this matter at the next meeting of German Naturalists and Physicians.

THE PRESIDENT, DR. C. H. BURNETT: — I understand that Dr. Roosa means that this paper shall be offered as Dr. Knapp's paper in the name of this Society, and his conclusions as the accepted opinion of the Society as far as he has carried them.

(The motion was adopted.)

DR. J. ORNE GREEN: — I move that Drs. Knapp, Roosa and Prout be appointed a committee on a Uniform Measure for Testing Hearing, to report in 1886.

(This motion was also adopted.)

CORRIGENDUM.

An error was made in the stenographic report of the 18th Annual Meeting of the American Otological Society, in the remark of the president, given at the top of page 359. It should be in the form of a question, "*Do* I understand, etc.?" and should precede Dr. Roosa's withdrawal of his previous motion at the bottom of page 358.

J. J. B. V.

TWO CASES OF NEGLECTED EAR DISEASE IN INFANTS RESULTING IN DEATH.[1]

By Samuel Sexton, M. D., *Aural Surgeon to the New York Eye and Ear Infirmary.*

Grave and even fatal ear disease in early life is of much more frequent occurrence, probably, than is generally suspected. Inflammation of the middle-ear tract may thus arise from head catarrh or other cause and rapidly extend itself to the dura mater without the warning usually given by the occurrence of a discharge from the external auditory canal. Or the discharge once established may suddenly cease because of the closure of the outlet through the drum-head, the secretions escaping *via* the Eustachian tube which is proportionately very large in infancy. The causes of special danger will be alluded to further on.

In the two following cases occurring in very young infants, however, early evidence was not wanting, even to the inexperienced, of serious aural trouble, and death was due to their neglect and ill-directed treatment.

CASE I.—OTITIS MEDIA PURULENTA; POLYPUS; FACIAL PARALYSIS; PACHYMENINGITIS; DEATH.

N. N.—Of Jewish parentage; age 6 months, was brought to my clinic at the New York Eye and Ear Infirmary, in March, 1884, with the following history: When 3 months old he was exposed to a draught coming

[1] Read by title at the meeting.

through an open window while travelling in a railway carriage. A few days afterwards a circumauricular swelling was observed to take place, which was, by order of the attending physician, poulticed with chamamile flowers, hops and Indian meal for three weeks continuously. The purulent matter which had been collecting was then liberated by a lancet. After discharging a week the opening was allowed to close, but subsequently it was again opened and dressed with a tent and some antiseptic salve. The ear and wound were syringed three times a day with an aqueous solution of one drachm of carbolic acid to the pint—the solution passing freely through from the wound into the canal. This treatment had been persisted in until the date of coming to the Infirmary. The child's mother thinks two considerable sized sequestræ were removed by the syringing about four weeks ago. The discharge, it was alleged, varies from time to time, and is now absent. The child nurses well and sleeps fairly well.

Examination. The lumen of the external auditory canal is obstructed with pus, the removal of which brings to view a large polypoid growth which fills the canal.

There is partial right facial paralysis.

March 13. Discharge from the ear and sinus more free to-day, but the child is restless. The polypus was removed by Sexton's snare. It was found to be of much greater size than had been expected, filling the tympanum and canal almost to the meatus externus. It was about one-half an inch in length and somewhat nodulated. There was free hemorrhage after avulsion which was, however, soon arrested by instillations of hot water.

The treatment consisted in gentle cleansing with warm water as required, afterwards dressing the parts with calendula and boracic acid. Internally the calcium sulphide in small doses was given several times daily.

March 15. There is diminution in the quantity of the

discharge, which is less purulent. General appearance is better, and the restlessness which existed before the operation is less.

I did not again see the patient; his mother, however, came several months after to the Infirmary to report his death. She said that the next day after his last visit he became more restless, had a cough and raised mucus. Vomiting occurred after nursing or taking food or medicine and continued until death, which took place on April 5th. The child ceased to nurse three days before death and for two days no discharge from either the meatus or sinus was observed. He had *convulsions* for two weeks, at the beginning of which "his face became straight again" (double facial paralysis) and at the end there was strabismus. These symptoms taken together with the previous history, point to pachymeningitis. It seems probable that the rapid recurrence of the polypoid growth, blocking up the outlets and preventing drainage, may have hastened the result. The physician who attended the patient at home certified that he died of "pneumonia, convulsions and dentition."

The apparent absence of suffering during the early part of the progress of the disease is noteworthy.

There was no autopsy.

The polypus removed was examined by Dr. Frank Ferguson and found to be a myxo-fibroma.

The following are the notes of the examination:—

The tumor is covered throughout by mucous membrane, excepting at the points of attachment. Covering this mucous membrane, near the points of attachment, are laminated cylindrical cells. In the same region the mucous membrane is arranged in large papillæ which can be seen with the naked eye. Elsewhere the surface of the tumor is smooth and covered by flat epithelium. Beneath the mucous membrane are large numbers of round cells. The

centre of the tumor is composed of fibrillated and granular material, numerous small round cells and mucous corpuscles. The vascular supply is abundant.

CASE II.—OTITIS MEDIA PURULENTA COMPLICATED WITH LYMPHADENOMA OF THE NECK, RESULTING IN CARIES OF THE ATRIUM, ATTIC, ANTRUM, TYMPANIC AND AUDITORY PLATES. FACIAL PARALYSIS, PURULENT MENINGITIS; DEATH; AUTOPSY.

Albert S., a Mulatto aged 7 months. The patient was brought to the N. Y. Eye and Ear Infirmary in June, 1885, with the following history:

Three months previous to this date, a small swelling appeared in front of the left tragus, coincident with a purulent discharge from the left ear. The swelling extended downward, rapidly enlarging, forming a large, irregular mass, occupying the whole of the left side of the neck. One month ago, the otorrhœa ceased almost entirely, and at the same time, the child was taken to a city dispensary, and placed under local and general medicinal treatment, for the glandular tumor. During this period of treatment the tumor fluctuated in size, a discharge appeared in the right ear, and the child became very restless and irritable, sleeping poorly, attacks of vomiting alternating with diarrhœa; and left facial paralysis was noticed for the first time.

Examination, June 1st. The left meatus was occluded by granulation tissue, which was removed, giving vent to a large quantity of very offensive purulent matter. The canal was dilated, the posterior and inferior walls presenting an ulcerated granular surface, the drum-head was entirely destroyed, and the tympanum presented a large cavity caused by the necrotic destruction of

portions of the *annulus tympanicus* and temporal plate, the inner wall of the attic and atrium, the antrum and auditory plate. In a word, the bony walls of the large pathological cavity thus exposed to view were denuded in every direction; the ossicles were absent with the exception of the stapes, which could be seen lying loosely upon the upper and posterior part of the inner wall. The right meatus was filled with granulation tissue which sprouted from the walls of the canal, the drum-head was destroyed, and denuded bone could be detected with the probe in any portion of the tympanum. On the left side of the neck, there were a number of lymphadenomata aggregated together, forming a large, irregular tumor, limited above by the inferior attachment of the auricle, and below by the level of the thyroid gland. No fluctuation could be detected in any portion of the mass. There was complete left facial paralysis.

Treatment. Small and frequently repeated doses of the tincture of aconite, and calcium sulphide were given, the canals being cleansed and powdered boracic acid insufflated once daily. During the next eight days the patient's condition improved somewhat.

June 8th, restless and irritable, with some febrile movement, temp. 102°; vomiting frequently. Discharge from ears, free.

June 10th. The patient became drowsy and stupid, had general convulsions, coma supervened, and patient died on June 12th.

Autopsy. The dura mater is healthy, with the exception of that portion covering the superior surface of the left petrous bone, which is much thickened from the deposit of neoplastic tissue, and at points presents isolated centres of ossification.

There is purulent meningitis of the convexity, the deposit of lymph being more particularly noticeable along the margins of the longitudinal fissure, and on the under surface of the anterior and posterior cerebral lobes. The cortical substance is quite soft and there is considerable accumulation of greenish offensive matter in the subarachnoidean cavity. No connection could be traced between the ear and glandular enlargement on the neck.

The accompanying wood cut, somewhat enlarged, shows the outer surface of the left temporal bone after the specimen had been prepared. The absence of the osseus por-

tion of the external auditory canal at this age brings the inner wall of the tympanum, which is very large, well into view; 1, is the promontory of the inner wall, and just above it is the foramen rotundum from which the stapes has escaped. The inner wall of the attic was gone, exposing the horizontal semi-circular canal. The walls of the an-

trum and the adjacent cellules were eroded away and the entire auditory plate was honey-combed. The auditory plate, 5, which was scarcely united to the squamous and mastoid portions, was undergoing sequestration, entirely denuded, and a sinus, 6, afforded communication between the antrum and an abscess beneath the periosteum.

The annulus tympanicus composing the anterior wall of the external auditory canal is shown at 2; it is roughened all around, as is the tympanic plate itself. The rudimentary mastoid process is seen at 3: the under surface of the petrous bone at 4. The squamous portion is shown at 7, 7: the parietal bone at 8, 8.

On the inner surface of the specimen, not shown in the cut, is seen an extensive opening along the line of the petro-squamosal suture through which, probably, the inflammatory process extended to the dura.

It is probable that in this case the inflammation extended itself from the tympanum along underneath the auditory plate into the antrum, whilst a periostitis externa manifested itself on the outer surface.

Remarks. In reviewing Case I, it seems remarkable that so little nervous irritability existed during the progress of the case, although the ear was deeply attacked. With the exception of the last two or three weeks the child suffered but little and so far as pain was concerned it may not have seemed important to the ordinary observer.

To the retention of secretions, the formation of which was actively promoted by the three weeks' persistent poulticing, and perhaps also to the vigorous syringing, was doubtless largely due the gravity of this case.

Although the treatment of a case in this advanced stage is somewhat expectant, yet it is generally best to administer frequently small doses of pulsatilla or aconite during the active progress of the disease in order to allay nervous irritability.

Acute aural inflammation in children often gives rise to symptoms well calculated to puzzle the general practitioner, and hence its presence is liable to be unsuspected; thus in Case I, the alleged cause of death as reported to the bureau of vital statistics did not include the aural trouble.

When the proportionately large area of the middle ear tract in children is considered, one need not experience any surprise at the frequency of its

invasion by disease. The tympanum, antrum, and Eustachian tube thus comprise a very much exposed region which occupy a dangerous proximity to the dura mater—being separated by an extremely thin plate of bone, often imperfectly closed by osseous tissue, specially along the line of the petro-squamosal suture. Free vascular communication is afforded through this thin partition between the middle ear and the dura, and in any inflammatory process in either the other is extremely liable to be affected.

The important knowledge to be obtained by observing the phenomena manifesting themselves in the ear in children is not available always without an expert examination; and this becomes a much more difficult matter when exterior manifestations are wanting, since deafness and distressing autophonia, etc., cannot always be explained by children, and never by very young infants, and pain in such cases may be relegated to another region. Although recovery may take place when the aural symptoms are not recognized, yet deafness may remain.

Too much stress cannot be placed on the advisability of avoiding a meddlesome and heroic plan of treatment, often practiced that "something may be done".

In these neglected cases it is well to remember that the danger does not lie in an invasion of the mastoid cellules, since the mastoid process exists in a rudimentary state only before the age of puberty, but in an extension of the inflammatory process to the antrum, caries of the bone being consecutive thereto. An independent but coincidental attack of periostitis externa may, indeed, take place. Where the latter occurs alone recovery is usually much more rapid, since, under proper treatment, re-absorption of pus takes place, or it is evacuated by the knife.

Sometimes large sequestræ, consisting of portions of the auditory or tympanic plate or of portions of bone containing the cochlea or semicircular canals, are removed after sequestration in these cases, specially in broken down or scrofulous subjects. It is surprising to witness the rapidity with which recovery often takes place after the detachment of very large pieces of temporal bone. Officious surgical meddling in these cases can but be most injurious, since it is not wise to attempt to separate sequestrating from healthy bone until nature has completed her share of the process. We have our hands full, generally, in the effort to maintain proper drainage. I have of late found strands of antiseptic cat-gut, as prepared by Mr. Am Ende, of Hoboken, introduced into either the sinus which usually exists behind the auricle, or into the external auditory canal, a very effective means of drainage. Beyond this, and dressings consisting of boracic acid and calendula locally, I have found it a good plan to let the ear alone and treat the patient.

I am indebted to my assistants, Drs. Wm. A. Bartlett and Robert Barclay, for the admirable care which these patients received while under observation. To them I am also indebted for the notes of the post mortem of Case II. which was under Dr. Bartlett's charge.

A FATAL CASE OF SUPPURATIVE OTITIS MEDIA, WITH ABSCESS OF THE CEREBELLUM, NECROSIS AND CARIES OF THE PETROUS PORTION AND HYPEROSTOSIS OF THE ROOF OF THE TYMPANUM; WITH WOODCUT.[1]

By Oren D. Pomeroy, M. D., *of New York.*

William Gruelle, a Belgian laborer, aged 38, came to the Manhattan Eye and Ear Hospital on Feb. 2d, 1885, presenting the following history. Since earliest childhood both ears had discharged until the twentieth year, when the left recovered, but the right has continued until the present time. Early in December, 1884, he fell and struck the right side of the head against a railing, which produced no appreciable affect, but on or about the 15th of January last there came a swelling over the mastoid of that side which was hardly painful at all, but it increased until the 31st day, when on awaking in the morning he found the right side of the face paralyzed. One week from this he went to the French Hospital on 14th street. After another week Wilde's incision was made by Dr. Adam, who was in charge, which evacuated pus. The periosteum of the mastoid was found partially detached. A tent was placed in the incision, disinfectants were used and the wound kept scrupulously clean. About one week before being removed to the Manhattan, the patient had a slight chill and the temperature rose to 103° Fahrenheit, and the surgeons in charge, Drs. Adam and Chauveau, concluding that the case was likely to be serious, asked me to take charge of

[1] Read by title at the meeting.

it at the Manhattan. He was treated a week as an out patient, when he was received into the wards of the Hospital on Feb. 9th. His pulse then was 100, respiration 24, temperature 103° Fahrenheit at 8 P. M. The opening made by the Wilde's incision was very near to the auricle and seemed to encroach upon the meatus, so much so, as to cause the posterior wall of the meatus to be pressed forward and touch the anterior wall in the cartilaginous portion. This rendered inspection of the tympanum impossible, but forceps were pushed far in and a soft material was felt which seemed like a polypus, and attempts at its removal resulted in some hemorrhage. A strong solution of arg. nit. was applied to the tympanum as thoroughly as possible and the meatus was washed out with carbolic acid solution. The latter treatment was used in the incision behind the auricle and an effort was made to force the fluid from this to the tympanum, but without success. The increased temperature of the 9th was reduced in a little more than one hour to 101¾° by one drop of tr. aconite every 15 minutes. On the 10th the temperature again rose to 103° at 8 P. M.

11th. Temperature at 4 P. M. 104°, which continued to rise until 7 P. M., when it was 107°; pulse ranged from 85 to 120. Ophthalmoscopic examination revealed a somewhat dirty looking disc, the right showing fainter outlines than the left. A consultation with many of the surgeons and physicians of the hospital resulted in recommending 5 grs. quinine every hour and a half until midnight; also bromide of potassium 20 grs. every two hours. By 12 M., temperature was reduced to 100¾°.

12th day morning; temperature normal, pulse 74, perspires freely, eats a sufficient breakfast and feels comfortable. At 10 P. M. temperature 100¾° and by 12 was 107°. The urine was found to have a specific gravity of 1024, slightly acid; no sugar or albumen. The ear and the incision behind the auricle was now cleansed with hyd. bichloride 1 to 2000.

13th, morning; temperature $99\frac{1}{4}°$, ordered quin. 15 grs. at 9 A. M. and 9 P. M. Both optic discs found infiltrated, vessels decidedly engorged, right more than the left. Stimulants and nourishment freely administered. Patient's manner very quiet. Temperature $99\frac{1}{2}°$. Ear and incision over mastoid discharging very little. 10 P. M. patient very restless, temperature $99\frac{3}{4}°$, pulse 72 to 74.

14th. Pupils thought to be somewhat sluggish, temperature $105\frac{1}{2}°$ at 3 P. M., pulse from 82 to 112, respiration 20 to 24. Quinine continued with stimulants and food; eats well and does not seem particularly ill.

15th. Optic nerves looking better, sight not much lowered, and patient seems in every respect better; quinine discontinued.

19th. Since last note the patient has had a daily rise of temperature from 101° to 104°. A considerable rise of temperature is always preceded by a rigor, and followed by a profuse perspiration.

20th, 3 P. M. Temperature $106\frac{1}{5}°$, profuse sweating; at 7 P. M. temperature slightly below the normal from 11 A. M. to 3 P. M. On consultation it was decided that a freer drainage should be maintained from the opening behind the ear and the patient was placed under ether, and the opening in the soft parts was considerably enlarged and what dead bone could be found was removed by the gouge and drill. During the operation a considerable venous hemorrhage resulted, which was arrested by compression.

21st. Seems better. Appetite good, no pain; tent passed into wound, which was cleansed and irrigated with the bichloride wash several times daily. Again administered 5 grs. quinine with 10 grs. of salicylate of soda t.i.d.

22d. Best day patient has had.

24th. Chill at 9 P. M., followed by fever, and at 10.30 temperature $107\frac{1}{4}°$.

25th. Temperature subnormal, perspiration very exces-

sive. Examined by the gentlemen of the department of nervous diseases. Both tendon reflexes raised, greater in right—marked ankle klonus, velum deviates to right. The dynamometer on first trial records right 30, left 31, and on second trial right 37, left 26, (he was right handed). Optic discs remain the same as in last report. Nothing very definite was concluded from the nervous examination. Ordered 30 gr. quinine and 60 gr. sod. bromid. at 5.15 P. M.; caused considerable deafness and tinnitus, but not more than the previous 15 gr. dose uncombined.

27th. Patient has done well since 25th. Hearing in left slightly improved by inflation: right unaffected. Ordered 15 gr. quinine and 30 gr. brom. sod. twice daily. At 10 P. M. temperature $104\frac{1}{5}°$. No chill nor sweating.

28th. The temperature rising about 2 P. M., 30 gr. quinine and 60 grs. sod. brom. were given and at 10 P. M. it was $99\frac{1}{2}°$.

March 4th. Patient has done well since last note, though temperature a little above; appetite good, manner natural; no chills and no sweating except on the 3d. A threatening rise of temperature was prevented by the quinine gr. 30 and sod. brom. gr. 60.

11th. Has done well: quinine only given when threatened with a rise of temperature.

13th. Temperature normal since last note. Ordered a tablespoonful of Warburg's tincture before each meal. The pus in the auditory canal shows pulsation.

28th. Patient has apparently been convalescent so that we had intended to send him away, but to-day he had nausea and vomiting which the patient attributed to fish balls eaten at breakfast.

April 1st. Not as well: fever and loss of appetite.

12th and 13th. Not improved, slight rise of temperature every day since last note; vomited yesterday (12th) and today. During last week had some neuralgia of right

side of head and face, which was attributed to defective teeth; appetite poor.

14th. Pain changed to the occiput. Breath and exhalation very offensive.

15th. Evidently worse; no appetite, pain still severe, temperature 96°, movement of eyes normal; facial paralysis increased; difficulty in swallowing and speaking; pulse 60, 50 and 46 during the day and very weak. Left optic disc shows a greater amount of infiltration than before. Right pupil possibly larger than left, but both very sluggish. 20 grs. of iodide of potassium given every four hours, with brandy and such nourishment as can be administered; temperature at noon $97\frac{1}{5}$°. At night pulse 46, very weak; temperature in rectum $98\frac{2}{5}$°, somewhat lower in axilla (most of the temperatures were taken in the axilla); restless, delirious and cannot swallow.

16th, 1 A. M. Pulse, 50. Patient quiet and inclined to sleep heavily.

4 A. M. Pulse 66, temperature (rectum) $99\frac{8}{10}$° and in axilla $98\frac{2}{10}$°; 5.30 A. M., death. The pulse just before death rose to 120, temperature (in rectum) $101\frac{1}{10}$°. One day before death patient admitted that he heard the tuning fork in right ear, which from the autopsy will be seen to be impossible. The autopsy was done by Dr. Prudden, the pathologist of the hospital, assisted by Dr. Sequin, and in the presence of many of the medical and surgical officers of the hospital. Notes of the autopsy taken by Dr. Tansley were as follows:

Skull cap symmetrical, of moderate thickness and normal. Dura mater, surface normal in appearance and tension. Longitudinal sinus empty and normal. Right half of pia mater dull in lustre; convolutions moderately flattened. On the left side the pia has the same appearance as the right, with occasional diffuse patches of thickening. Upon cutting through the tentorium of the right side, yellow and bloody

pus wells through the incisions. On removing the brain, moderately fresh adhesions found over the middle fossa. On the right side the brain was adherent to the posterior surface of the petrous bone by means of fibrin and pus. Cerebellum seen from the base presents a suppurating surface on anterior aspect of right lateral lobe; the external portion of the same lobe is apparently broken down and somewhat torn. No apparent lesion of the medulla. The purulent mass on the right side of the cerebellum extends to the trigeminus and the nerve is slightly reddish and bound down by exudation. A small part of tentorium cerebelli, $\frac{1}{4}$ inch by $1\frac{1}{2}$ inches, is adherent to the surface of the cerebellum. The adhesion is just behind the line of attachment of the falx to the petrous bone. A horizontal incision through the right lateral lobe of the cerebellum shows no central abscess, but an extensive suppurative softening of the whole anterior portion of the lobe. About one-half inch external to the nucleus dentatus is a spot of punctate congestion in the white substance. The lesion is one affecting the cortex of the cerebellum and derived by contiguity from the diseased dura. In the upper anterior region of the right lobe just beneath the cortex is an abscess containing bloody purulent fluid and extending obliquely backwards towards the vermis.

This cavity is irregular and $1\frac{1}{2}$ inches in length by $\frac{1}{2}$ inch in width. The abscess cavity begins just dorsal of the processus ad pontem and extends obliquely backwards as far as the vermis superior.

In general terms the anterior and upper third of the right lobe of the cerebellum is more or less disorganized. The vermis superior is normal though soft.

Left lobe opened by single central horizontal cut is normal; the vermis inferior is normal.

Floor of fourth ventricle is normal.

Base of brain. Moderate opacity of pia, about the large

vessels. Moderate amount of fibrinous and purulent exudation underneath the right posterior portion of the hemisphere, corresponding to the cerebellar lesion. Hemisphere examined by transverse incisions about one inch apart, shows the ventricles to be *much* enlarged and their floors smooth. The brain is soft and watery. This lesion differs from the ordinary classical aural abscess in the absence of very localized and dense pachymeningitis; the diffuseness of the adhesions to the cerebellum and the fact that the suppurative process involves the cortex and the subcortical white matter of the cerebellum instead of being a subcortical globular and more or less encapsulated abscess.

Over the posterior surface of the petrous bone the dura is thickened and covered with an irregular pellicle of an average of one m.m. in thickness apparently of fibrin and pus; this formed the anterior wall of the abscess which bordered the suppurating surface of the cerebellum. The dura over the superior surface of the petrous bone is normal except near the attachment of the tentorium where it is loosely attached to the bone beneath which is white, eroded and softened.

The superior region of the petrous bone over its middle inch extending for about $\frac{1}{4}$ inch on either side consists of a nearly detached portion of necrotic bone from beneath which oozes—upon pressure—a nearly diffluent reddish mass, apparently bloody pus. Both exposed surfaces of the petrous bone are mottled with black and red spots.

Percussion is completely dull, in marked contrast with the bone on the opposite side, which is ringing.

The microscopical examination of the dura mater covering the petrous bone and adjoining the abscess of the cerebellum showed the inner surface of the dura mater covered with a layer of pus and fibrin with a thin layer of organized new tissue beneath it. The membrane was

otherwise normal: its substance not being infiltrated with pus.

The early *diagnosis* of this case was attended with some difficulties. The rise in temperature, with rigors and sweating, seems to have been the most important symptom. A careful estimate was made with the view of eliminating malaria, especially as one of the consultants stated with some positiveness that such an excessive rise of temperature could not depend on cerebral disease where the patient always maintained perfect consciousness as in this case. No regularity in the recurrence of the rigors and rise of temperature could be observed and malaria had to be excluded. *The absence of pain* until the last, was opposed to the idea of brain complication, this being in a large number of similar cases a characteristic symptom. The *eyes* never once showed a tendency to turn to one side, that is, in the direction of a cerebellar abscess, and in an opposite direction, in abscess of the cerebrum. The pupils, although somewhat sluggish, did not assert anything positive of diagnostic value. The double optic neuritis caused us to suspect brain complication, and the inflammatory thickening of the meninges beneath the chiasm confirmed this suspicion. The offensive odor of the patient pointed to septicæmia plainly enough, but this symptom was wanting until late in the disease. The patient's apparent recovery a few days before death seemed a hopeful symptom, but it is well known that a patient may carry an abscess of the brain without any symptom of its presence whatever. The fact that the patient, aside from the symptoms already noted, did not seem very ill, being able to sit up much of the time, to walk about and with a good appetite and digestion, still further added to the difficulty of diagnosis. There seemed no special indication for *operative interference*. It was pretty well known after

a time that there was no serious mastoid cell disease. The incision behind the auricle was placed very near to it, and there was a tendency of the cavity, resulting from this incision to encroach upon the soft parts of the meatus, so as to crowd the posterior wall of the latter so far forwards as to close it, making it well-nigh impossible to investigate the tympanum, although from the sense of touch, a polypus was detected. Efforts at its removal only partially succeeded, and the autopsy revealed a polypus nearly filling the tympanum. This should have been removed if it were possible, as the cause of the whole difficulty evidently depended on the obstruction to the free discharge from the tympanum caused by the polypus. Another fatal case in the hospital under the care of Dr. Tansley seemed to be developed from a similar cause. In both cases the necrosis of the petrous portion of the temporal bones seemed to be brought about by the disturbance of nutrition incident to the pus retention.

It seems probable to the writer that any effort to save life in this class of cases is likely to be abortive after there are continuous symptoms of rigor and rise of temperature. The specimen before us—see woodcut—is most interesting.

The woodcut is made from a photograph. Lines of separation may be seen in several portions, produced by caries, which at B, B, B, resulted in complete separation after maceration. These parts were held in position by gum acacia. M: Meatus externus. T: Tympanum; below the letter is seen the ossicula, the lower-most one being the malleus, which is in situ, but in the cut is placed too horizontal. At the left of the letter T is seen the cochlea. The section is made in the posterior portions of the tympanum and meatus. The roof of the tympanum measured ten m. m. in thickness, fully equal to the longest diameter of the tympanum. The mastoid cells were healthy, except that some were obliterated by osteo-sclerosis.

In the autopsy a general description of the appearances of the brain and petrous bone are given, but after dividing the petrous bone with a saw through the posterior portion of the tympanum and osseous meatus externus, we observe that the roof of the tympanum is of enormous thickness, measuring ten m.m. This thickened roof is made up mostly of two rounded solid masses of eburnated bone which before the maceration (soda and boiling water) was loose and semi-detached, but afterwards became wholly so, and were again placed in position and retained by mucilage of acacia. This carious separation would cause one to suspect that the bone had more than a single origin of development. At one time it seemed as though we had an enormous ostotic tumor in the roof of the tympanum, but the cochlea and semi-circular canals being easily recognized in situ, without any abrupt difference in the quality of the bone in this region, compelled the conviction that we had to deal with a *Hyperostosis of the roof of the tympanum* and immediate neighborhood, evidently due to the life-long inflammatory process existing in the part. I have not seen a similar case to the preceeding and am disposed to regard it as somewhat unique.

There has recently been three fatal cases of brain complication from ear trouble in the Manhattan, and in neither of them has there been a sufficient mastoid complication to influence the course of the disease, or call for operation, although in one case the cells were opened, but

no disease was found. The notes of this case were very carefully taken by the housesurgeon and the assistant housesurgeon, Drs. Beard and Hale.

INFLAMMATION OF THE ATTIC OF THE TYMPANUM.

By Samuel Sexton, M. D., *of New York.*

Inflammation of the middle ear is subject to certain limitations due to its anatomical construction, especially of its osseous boundaries, and that arising in the attic is, owing to its sequestration, usually of much more significance than the form which begins in the atrium. This form of disease has not, it is believed, hitherto received the attention its importance demands; indeed, in its early stage, it is likely to escape observation altogether if examination of the ear be limited, as it very often is, to an inspection of the membrana tympani only, since this membrane may not at any stage of inflammation of the attic be greatly or at all affected.

Inflammation of the *atticus tympanicus* may be considered under two forms—acute and chronic. The latter having attracted the attention of writers before the former, I shall first review what has been written about it before considering the acute form.

Chronic Inflammation of the attic presents itself frequently in the form of a deep sinus, containing, sometimes, either pultaceous matter or inspissated pus, sometimes polypoid tissue or epithelial crusts, leading through the membrana flaccida or inner extremity of the external auditory canal up into the attic—and frequently from thence into the antrum. Sometimes the membrana flaccida and ossiculæ are missing in these cases, and we find that the

margo tympanicus of the auditory plate is covered by cicatricial or granulation tissue, and that a large cavity extends beyond, which may be explored with a bent probe. Again, in other cases, the membrana flaccida remains, together with the incus and malleus, and even a portion of the membrana tympani; these, from thickening of the tissues, may obstruct drainage from the attic by narrowing the outlet from above. Any of these chronic processes may last for many years; I have seen such pathological tracts or cavities in very old people, a result of acute inflammation of the attic in early life. Troeltsch, who observed these sinuses twenty-five years ago, believed that they were due to perforation of the roof of the external auditory canal in cases where the cellules sometimes extending over this region were the seat of disease. That their origin may be thus explained in some cases I have no doubt, but more frequently they depend on perforation of the membrana flaccida. Subsequently this condition of things attracted the attention of others; several cases came under the observation of Dr. J. O. Green, who, under the head of "An unusual variety of purulent inflammation of the tympanum," described them in the *Boston Medical and Surgical Journal*, March 6, 1874. He regarded the trouble as beginning with a catarrhal inflammation, which afterwards became purulent, and to a greater or less extent involved the entire tympanum—"but the mucus secreted among the ligaments and other structures in the upper part of the tympanum is unable to gravitate to the floor of the cavity on account of its confined position." Both Drs. C. H. Burnett and C. J. Blake reported cases at the meeting of the American Otological Society in 1874. Subsequently the latter drew attention to acute invasions of the upper part of the tympanum (*American Journal of Otology*, April, 1882), observing that the tympanum becomes inflamed during the first few hours, at the furthest in

twenty-four hours, and that when the membrana tympani was opened it gave vent to a copious serous discharge. He seems scarcely to have considered the affection as arising altogether independently of the atrium of the tympanum, a view also seemingly accepted by Buck, who states in his book on the ear that purulent matter escapes through the membrana flacçida in acute purulent inflammation of the tympanum, because less resistance is offered in that locality.

Before considering the acute form of inflammation of the attic, as observed by myself, and for some years demonstrated to my students at the New York Eye and Ear Infirmary, I beg to allude briefly to some points concerning the anatomy of that portion of the ear under discussion, which, for the most part, lies immediately beneath a wide triangular plate of bone on the anterior surface of the petrosa, known as the tegmen, consisting of the attic, antrum, a varying number of cellules, and the Eustachian tube.

"The *attic*[1] of the tympanum is a pyramidal recess over the atrium, and above the tympanic orifice of the external auditory meatus. Its upper anterior boundary is the tegmen, which separates it from the cranial cavity, and is mostly provided with a layer of spongy substance of variable thickness. Its inner boundary is a convex prominence (Fig. 1, *e;* Fig. 2, *b*), produced by the contiguous portions of the external semicircular and facial canals. Its outer boundary is the wide crescentic tympanic scute (Fig. 1, *b;* Fig. 2, *c*) of the auditory plate. It opens above the prominence of its inner boundary, outward and backward, by a large aperture[2] into the mastoid antrum.

"Beneath, it opens into the atrium by an elliptical aperture, formed internally by the ridge of the facial canal, and externally by the tympanic margin of the auditory plate.

"The *mastoid antrum* (Fig. 1, *d;* Fig. 2, *f*) is a prolongation of the attic backward and outward in the spongy substance of the mastoidea. It is of variable size, ordinarily ranging from that of the attic to double the dimensions of this. It sometimes ends in a blunt, flask-like recess, but is oftener more or less extended downward among the cellules of the mastoid

[1] "Atticus tympanicus, upper chamber of the tympanum of Huxley."

[2] "Petro-mastoid canal of Sappey."

process. Frequently it gives off a smaller fork or passage (Fig. 2, *g*), which is directed outward and upward among the cellules above the external auditory meatus; and rarely a third branch is directed more anteriorly. While the atrium of the tympanum varies but little in size, the attic and mastoid antrum vary greatly."[1]

Fig. 1.

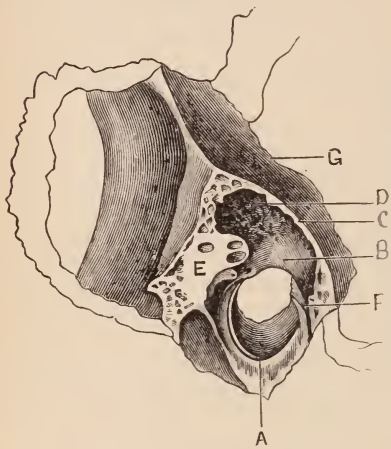


Fig. 1 (Leidy).—View from within of the outer portion of the left temporal bone, sawed through the tympanum, fore and aft, parallel with its inclination. *A*, tympanic margin of the external auditory meatus, formed below and at the sides by the grooved margin of the tympanic plate, and above by the margin of the auditory plate; *B*, scute, forming the outer boundary of the attic; *C*, tegmen; *D*, mastoid antrum; *E*, prominence of the inner posterior boundary of the attic; *F*, canal for the accommodation of the long process of the mallet; *G*, petro-squamosal fissure. Below *E* are seen the pyramid and the aperture of the tympanic cord.

Fig. 2.

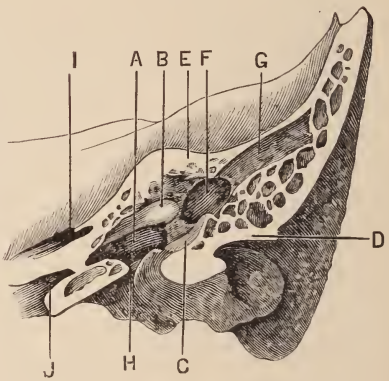
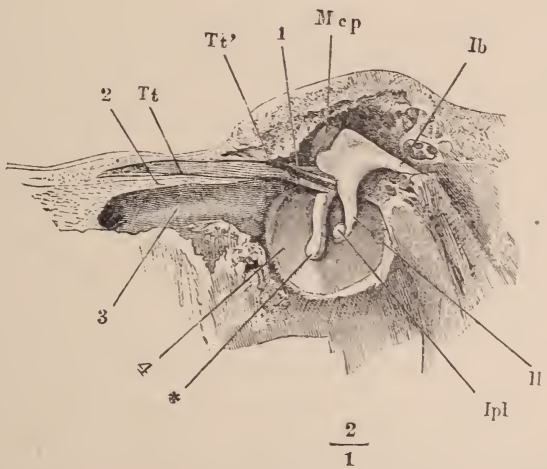


Fig. 2 (Leidy).—Section of the left temporal bone through the squamosa, immediately in advance of the external auditory meatus. *A*, atrium of the tympanum; *B*, prominence on the inner back part of the attic; *C*, scute at the outer part of the attic; *D*, auditory plate; *E*, tegmen; *F*, mastoid antrum; *G*, anterior passage of the same; *H*, canal for the long process of the mallet; *I*, hiatus of the facial canal; *J*, Eustachian tube.

If now we carefully remove the *tegmen* in the recent subject, and look down upon the parts thus exposed to

[1] The anatomical description above is from Leidy, *Science*, May and June, 1883.

view, we shall find the attic and antrum *in situ*, and everywhere lined with mucous membrane. The attic is divided by the incus and malleus, which are placed across it fore and aft, into an outer and inner apartment; they only partially occupy it, and the long process of the former and the handle of the latter project down into the *atrium*. The two attic apartments, of which the inner is much the larger, communicate freely with each other overhead, with the atrium below, the Eustachian tube in front, and the antrum behind. The outer apartment is wedge-shaped, wider above and gradually becoming narrower below, where the body of the anvil and neck of the mallet lie almost in contact with the margin of the auditory plate.



View from within of the right tympanum and contiguous parts. From Henle. *Tt*, *Tt'*, tensor tympani; *Mcp*, head of the hammer; * handle of the same; *Ib*, short, *Il*, long process; *Ipl*, lenticular process of the incus; *I*, chorda tympani; 2, septum tubæ; 3, tube; 4, drum-head.

The bottom communicates anteriorly and posteriorly with the atrium by a very narrow slit.

The inner apartment communicates much more freely with the atrium, but the passage is contracted by the prom-

inence before alluded to on its inner wall, the impingement of the anvil and mallet, and the cord, ligaments, and folds of mucous membrane. (See Fig. 3.)

Acute Inflammation of the Atticus Tympanicus.—This may occur from catarrh of the head, due to exposure or consecutive to the exanthemata, and to the entrance of fluids propelled along the Eustachian tube in bathing or from the use of the nasal douche. It happens very often that the attic only is affected from these causes. This can readily be understood when it is kept in mind that the tympanic orifice of the Eustachian tube opens by a free sweep into the attic as well as into the atrium, and that fluids traversing the canal with considerable momentum would follow the upward sweep of the tympanic embrasure rather than gravitate downward. Moreover the presence of irritating fluids seems to be much better borne in the lower than in the upper part of the tymanum. Inflammation of the attic may develop consecutively to imflammation of the atrium, and, of course, both may be affected simultaneously.

Inflammation of the attic is a much more serious affair than that of the atrium alone, because of the swelling of the mucous membrane which closes up the outlets and thus prevents drainage.

Inflammation of the attic is usually ushered in by more or less pain. As the disease advances the outlets are more or less closed, and the escape of secretions is thus interfered with. It will generally be found on examining the ear that the membrana flacçida is red, the vascular turgescence extending above on to the external auditory canal, and perhaps downward about the short process of the mallet. In favorable cases the regressive stage may begin at this time, but frequently the inflammation which was thus extended from the bottom of the outer apartment of the attic beneath the margo tympanicus of the auditory plate is attended with effusion of serum or blood; this

raises up the membrana flaccida and the adjacent integument of the external auditory canal, which is quite loosely attached to the outer surface of the auditory plate. In some instances the bulging out of these parts is sufficient to form a sac which entirely conceals the membrana tympani, or may even entirely fill the canal and present at the lumen as a purplish tumor. It would seem that in some instances rupture of blood vessels belonging to the tympanic plexus takes place, giving rise to the sudden extravasation of a large amount of sanguineous fluid. The tumor thus formed does not always communicate with the attic at first, although later on it may do so.

In a certain number of cases of inflammation of the attic, drainage continues through a small perforation in the membrana flaccida, a nipple-like outlet forming which may easily be mistaken for a polypoid growth; indeed, a polypus may subsequently develop from the mucous membrane presenting at this opening.

In a certain number of cases periostitis is present in a marked degree, affecting the neighboring parts; where it extends outwardly, the canal is red and glazed in appearance, but not as much swollen as in the cases above described. The periostitis is liable to spread itself outwardly over the auditory process, and thence along the surface of the mastoid or squamous surfaces of the temporal bone.

Inflammation may also extend downward into the atrium, producing characteristic symptoms in this part of the tympanum.

As long as the membrana tympani and the atrium are unaffected there is comparatively but little deafness, although autophonia may be present.

In nearly all of these cases the inflammatory process in some degree extends inward and backward along the petro-mastoid canal into the antrum; it may advance

thence into the mastoid cellules or those lying above the external auditory canal or in the tegmen. When the escape of secretions into the atrium or Eustachian tube is prevented, the case is usually much more severe. It is in these cases that extension to the cranial cavity is most likely to occur. In children the imperfect closure of the petro-squamosal suture affords a much more easy invasion of the cranial cavity, and in adults even this often is a weak point. The antrum may remain in a diseased state after all tympanic trouble has abated, and both the membrana flaccida and membrana tympani have closed, drainage taking place through the Eustachian tube, or by means of a sinus out through the cortex of the mastoid.

The gravity of the case must be determined by the pain experienced and the appearance of the organ — symptoms not always sufficient to establish a differential diagnosis. Pain is often absent where the attic and antrum are affected, whilst in periostitis externa it is frequently severe; its presence, therefore, may in many instances be regarded as rather a question of temperament, at least as regards the tolerance of suffering, than as indicating the extent of the disease. Moreover, it is difficult to distinguish between the pains of middle ear disease and those of pachymeningitis. As regards the physical signs, when the membrana flaccida and inner superior wall of the canal are red and angry in appearance, whilst there is tenderness over the mastoid or at the attachment of the auricle, we may conclude that the disease is most likely to expend its force externally; if pus makes its appearance early at the membrana flaccida, there is less probability of extension inwards. In young children, or in subjects of ozæna, periostitis externa is liable to be succeeded by caries of the temporal bone which may extend itself down into the antrum. The purulent matter escaping from the attic through the membrana flaccida or from a mastoid sinus in cases of ozæna is characteristic of this disease.

A consideration now of the treatment of inflammation of the middle ear from the writer's point of view need not include the generally accepted methods, but only such as have not, perhaps, been so extensively tried by others. The more serious cases met with occur usually from neglect or maltreatment in persons run down from some cause, and fixed rules for guidance in such cases cannot be made. It is my practice to administer remedies reputed to control inflammatory and purulent action in all cases; relying upon minute doses of mercury in inflammation of mucous surfaces until purulency threatens, when the calx sulphurata is indicated. Pain and vascular excitement may be controlled by aconite, belladonna, pulsatilla, gelsemium, and other remedies. In certain cases much relief may be obtained, or even a cure may result, by removing secretions from the attic through the Eustachian tube, a successful case of which I reported in the *Lancet*, October 18, 1884.

Where the above means, together with the local treatment to be mentioned further on, have been resorted to early, I have never met with a fatal result, and grave symptoms have been much less frequently encountered than when local measures only were employed. In the local treatment where there is simply redness of the membrana flacçida, due to acute catarrhal inflammation, a regressive course is soon established in many cases and any local interference is inadvisable. Where there is periostitis of the canal, incisions often do harm, but where catarrh advances to the purulent stage, the symptoms may become more urgent and the employment of the knife demanded. Unless a sac containing sanguineous matter or pus has formed, and is connected by a sinus with the attic, it will be useless to cut down upon the inner end of the canal or the membrana flacçida, because the knife cannot be thrust through the auditory plate underneath. Vent to secretions in the attic may be assured in some cases by introducing the

myringotome through the upper edge of the membrana tympani and behind the long process of the incus. The danger of wounding the chorda tympani nerve is considerable in this operation, and incurrence of the risk would only be justifiable when symptoms were urgent.

When purulent matter forms in periostitis externa, after Wilde's incision, drainage can be maintained best by the employment of two or more thicknesses of catgut. This has the advantage of being easily introduced folded end foremost and is not so irritating as most dressings. Where a sinus enters the antrum or cellules, this dressing permits free drainage, and if the number of folds be gradually increased the opening may be enlarged to almost any desired extent. This seems to aid greatly in the disappearance of minute sequestra. The catgut should be changed as often as once or twice daily. I am indebted to Dr. Thomas M. Markoe for the suggestion of the surgical use of catgut.

Where inflammation has extended to the antrum, either from without in consequence of caries due to periostitis externa, or along the petro-mastoid canal from the tympanum, the surgical aspect of the case may become paramount. From my own experience an extension of the diseased process from the attic is a common occurrence and usually calls for no special interference. But in neglected and otherwise unfavorable cases drainage must be secured whether we have to deal with middle ear disease or any of its complications. Ineffectual operative procedures here needlessly torture the patient without accomplishing the end in view; an operation for the relief of pachymeningitis might thus be tantamount to trephining because of the pains of middle ear disease, a procedure which at best would not probably liberate the products of inflammation of the dura, even if any were present. I cannot, therefore, from this point of view, regard trephining the

mastoid as other than a means of drainage, not likely to affect the course of pachymeningitis or cerebral abscess.

There is, of course, a wide and honest difference of opinion in respect to the method of securing drainage in purulent middle ear disease, but the writer is constrained to believe that on the whole there is over-much energy manifested in accomplishing this object.

Observation continued since this question was last discussed before this Society confirms the belief then held that we may often avail ourselves of the tendency manifested by the pent-up products of inflammation to escape through the posterior wall of the external auditory canal by perforating the posterior edge of the thin auditory plate just above where it joins the tympanic plate. This operation opens up immediate communication with the attic and petro-mastoid canal. In a large number of instances the same object is attained by perforating the membrana flaccida as previously recommended. Efforts must not be omitted in these cases to reëstablish drainage from the attic down into the atrium, nor should it be forgotten that a communication with the Eustachian tube very frequently remains in these cases.

In the local treatment of chronic cases where sinuses remain, after the removal of polypi or other products, salicylic acid has, in my hands, been attended with the best results, bringing about a dry desquamative condition, which is often the best issue to be hoped for.

DISCUSSION.

Dr. D. B. St. John Roosa, New York :—I should like to ask the reader of the paper a question in order to bring to my mind a little more clearly the kind of cases of inflammation occurring in children, in which he gives these drugs, and the other treatment to which he referred. For example, if Dr. Sexton would take the time to outline, as he can so well do, a case of acute inflammation of the tympanum and tell us just what he would do,—I mean just such a case as ordinarily occurs and how he would give the drugs and how immediate are the effects in the relief of pain. The urgent symptom to which the attention of the parents and friends of the little patient is attracted is the pain, and it is this symptom, that we are most urgently asked about. I believe that the therapeutic resources are to be immensely added to, judging from what we do know, but I should like to know if we have made a great advance in this way. It is well known that, as a class, we are not in the habit of using these drugs. I should like to know a little more definitely than has been told us how they are to be used. What would Dr. Sexton do, for example, with a child six months old suffering with acute pain, perhaps a red drumhead, with tender tragus and tender mastoid, in fact, with all the signs of acute inflammation?

Dr. Sexton :—I should be happy to endeavor to reply after the paper has been discussed.

Dr. Roosa :—I thought if the doctor would do it now, it would facilitate the discussion. The point did not seem to be clearly brought out.

Dr. Sexton :—This is rather a side issue. One of the less important parts is the treatment of cases in children. I, however, have no objections to stating my method a little later, unless it is wished at present.

Dr. Roosa :—I will then say a word or two as it will

serve in the discussion later on. I have nothing to discuss in this general discussion of the anatomy of the tympanum, nothing to add and nothing to criticize, but I confess my entire ignorance in regard to the treatment as here brought out. This I did not understand to be a side issue, since the doctor has exhibited the medicines and distinctly said that they were not in common use in the way he used them. Now, from my present point of view, perfectly willing and anxious to be converted, I find that the cases of acute aural disease coming under my notice yield to what I would call the expectant plan of treatment so far as the internal administration of drugs is concerned; that is, no medicine at all except a cathartic if necessary, or, in certain instances a diaphoretic, which may often be replaced by sponging, but when it comes to the treatment of acute suppuration or catarrh of the tympanum in young or old, to relieve the urgent symptom "pain" to which I have called attention, I have never found any efficient drug. I have not used the drugs in the way Dr. Sexton has proposed, not in as small doses as the one one-hundredth to the one-twentieth of a grain of mercury, not even so small a dose as that, usually one-tenth to one-fifth of a grain of certain preparations of mercury. I have also used the sulphide of calcium. I have had no results whatever that I could attribute to the drug. The relief of pain was no greater than that obtained by local measures alone, the use of hot water, and of late, in some cases, cocaine, poultices and leeches. It is not necessary to cut open every drum-head. We do not need to make a Wilde's incision into every mastoid. As a rule, we do not have occasion to use leeches in young children. While I am in a perfectly catholic frame of mind and anxious to be converted as it would facilitate treatment, yet all the specific drugs that I have employed have been a delusion and a snare. A warm room, good nursing, taking care of the

bowels, sponge bathing in addition to the local means according to the circumstances of the individual case, has thus far satisfied me exceedingly well. Still, as I said a few minutes ago, I believe that we are beginning to advance in our therapeutic resources. When I look at a syphilitic sore throat and see what is done by iodide of potassium, I can imagine what may be done by remedies as yet undiscovered or unemployed. I do not approach this in any sceptical frame of mind, but I fail to see that clearness of expression as to the manner in which these drugs are used to the exclusion of local measures. I fail to see the proof that they are necessary, because where they are administered in connection with the use of local means, a man like myself would say that there existed great doubt that the medicine had anything to do with the relief. It was on that account that the inquiry was honestly made and I hope to hear the writer of the paper more fully as to just the kind of cases in which we may hope by the use of these drugs, to take away the necessity for the use of the more vigorous measures which have been in vogue since the time of Wilde, and which all of us, more or less, constantly employ.

The President, Dr. Burnett:—The inquiry of Dr. Roosa is a proper one and as there are no doubt other members of the Society who would like to hear Dr. Sexton, he need not hesitate to make his remarks now.

Dr. Sexton:—Some of the gentlemen present who will probably discuss the paper, are familiar with the pathological conditions and the causes of these occurrences and I thought that as that was the great object of the paper, perhaps it would be well to first devote attention to that, but if the Society is willing, I have no objections to make a few remarks about these drugs. Of course every one would understand from my paper that I did not use drugs to the exclusion of local measures. As to the

use of drugs, it is really not giving a smaller dose of mercury or a smaller dose of calcium sulphide, if you will, since their minute subdivision enhances their activity and hence they are more likely to be absorbed. They act more quickly and by giving them frequently, we may get a sufficient quantity of medicine into the system in a short time.

In the cases of inflammation that Dr. Roosa has referred to, I have been in the habit of giving calcium sulphide, repeating the dose every hour or half hour the moment there seems to be any tendency to purulency. I think that it has a controlling power over inflammatory processes. I believe that others agree with me in regard to its effect in suppuration in other regions of the body. Ringer and Otis have drawn attention to that. If the drug is crowded at that point, I think we should increase suppuration. We should watch the action of the drug and withdraw it or lessen the dose at certain stages. As to the frequency of the dose, I can not lay down any rules, because that would be influenced by the age of the patient and the condition of the part. No one can outline a case that would apply to all. The same remark applies to the use of mercury. I do not employ mercury where there is suppuration, but in the catarrhal stage, where there is nasal catarrh with catarrh of the tympanum, I have found no remedy which acts so well as minute doses of mercury. I do not think that it would be worth while to go into the details of local treatment, for every one agrees that cleanliness is necessary without violence. I do not think incisions into the canal are often beneficial where there is periostitis of the canal, but when pus collects in the mastoid region, I think that we should lose no time in liberating it. At the same time, I have seen congestion and swelling over the mastoid proceed no farther under the use of calcium sulphide. I have seen this so often since 1875 that I am convinced that the

drug is of great service. The value placed on the action of drugs is based on the experience of the practitioner, and in this instance I have been satisfied with the results.

I also use boric acid and calendula in the treatment of the drum-head in the healing process, and I should not use violent syringing for the removal of secretions even when the drum-head begins to heal.

Dr. J. A. Andrews, New York: — As having a direct bearing upon inflammation of this part of the tympanic cavity, I will relate a case of which this drawing illustrates the appearance. The inflammation was most intense in the upper part of the tympanic cavity and communication was established between the mastoid antrum and the external auditory canal through a perforation (congenital defect?) in the postero-superior part of the bony canal. The patient did not die. This drawing was made to show the point of communication.

I saw the patient, a physician, at the Marine Hospital, New York, a week after the first symptoms of inflammation were noted. He had been treated with poultices applied over the ear; nothing more had been done for him. When I saw him there was redness over the mastoid but no tenderness. The redness was probably due to the poulticing. There was a great deal of swelling of the external auditory canal. Inasmuch as he was suffering greatly with pain and as leeches did not relieve it, I put him under ether and told him I would explore the external auditory canal and, if I found it necessary, open the mastoid. On examination, I found fluctuation in the postero-superior part of the canal, which I incised, giving exit to a small quantity of pus. I then introduced a probe and found that it passed through an opening in the bony part of the canal, a little beyond the beginning of the latter. I enlarged this opening and removed a small amount of pus and blood. There was slight hemorrhage. A drainage tube was

introduced, and free drainage maintained through the external auditory canal. He made a good recovery.

About two months subsequently, almost the entire canal was occluded by a membrane, behind which the discharge continued. At different times I made application of nitrate of silver to the part behind the membrane, in the upper part of the canal, whence proceeded the discharge. He was ordered to Pittsburg, and I saw him six weeks subsequently, at which time the membrane covered about one-half of the canal. He was again called away to Memphis and on his return, a month later, about one-fourth of the canal was occluded. Recently, the discharge has stopped entirely and the membrane has disappeared. The membrane was very tense and hard, and it disappeared without treatment.

Dr. Oren D. Pomeroy, New York:—I would ask Dr. Sexton a question, purely for the sake of finding out something more about mercury. I am a firm believer in the antiphlogistic properties of mercury in certain diseases, as pneumonia, for instance, if antiphlogistic is the proper word to use in these days. I understand that it has two actions in these cases. First, it is a sedative, acting on the vaso-motor system and diminishing hyperæmia; and second, it causes absorption. Where mercury is administered in a case of acute inflammation with pain, does the doctor believe that there is relief from pain in a few hours, and if so, what is his theory as to its action? I am unfamiliar with the power of mercury in that particular kind of case. It may have the power of relieving pain by diminishing inflammation, but I have no experience with the drug used in this manner.

Dr. Sexton:—I fear that I am unable to answer the question fully, as the action of mercury has not, as yet, been thoroughly demonstrated. The word "alterative" has been considered to cover it. I have not used it exclusively

for the relief of pain, nor have I recommended it for this purpose. If acute catarrhal inflammation subsides under its use, I have no doubt that it would relieve pain, but I always give something with it to relieve pain. As I neglected to mention that, I will here state that, for the relief of pain, I use aconite and pulsatilla; the latter is especially adapted to children as it has no decided cumulative effect. Four or five drops may be added to a wineglassful of water and a sip of this taken every fifteen or thirty minutes. In a great number of cases, this relieves the pain. I prefer to use this to giving opium freely, which disturbs the digestive system. Calcium sulphide, when given alone, will sometimes relieve pain. If the supposition is true that it is of service in suppurative processes, it would naturally follow that it would relieve pain, if it relieved the conditions producing suppuration.

Dr. David Webster, New York: — How soon will it relieve the pain?

Dr. Sexton: — That is a matter which depends on many conditions.

Dr. Webster: — A hypodermic of morphia will relieve it in five minutes.

Dr. C. R. Agnew, New York: — We may learn something from an illustration, however faulty it may be. When there is a bull in a china shop, the wise course is to put him out as soon as possible. When there is acute otitis media, it is our imperative duty to garrote or arrest the morbid process in its very incipiency. I do not believe that we shall ever reach a degree of knowledge which will give us many specific remedies, but I think that we should, if possible, crystalize our experience as practitioners in such a way as to know what we should attempt to do in a given emergency. If we are called to see a man who is passing a renal calculus, we give as a preliminary remedy an injection of morphia. If we are called to a man in

collapse, we give an injection of a diffusible stimulant in the connective tissue. If called in a case of hemorrhage, we apply the appropriate styptic. If called to a case of acute otitis media, we should know what we would do, according to the age and stage of the case. If a member of this society were to walk into my office and tell me that he had had nasal catarrh for a day or two, and that last night he was seized with severe pain in the ear and had passed an agonizing night, and if, on examination, I found the drumhead red, and other indications of acute otitis media, I would give him fifteen grains of calomel at once and if possible have the Turkish bath used; just as if I had a case of glaucoma, I should operate as soon as I could get my instruments out; just as in a case of acute pleurisy, I would give fifteen or twenty grains of calomel.

In the case of infants, there is always a certain indefiniteness in the history. You are told of restlessness and wakefulness and crying and other symptoms which had been attributed to teething. You do not see such cases early enough to strike the best blow. I would like to know what Dr. Sexton does when called to an infant six months old, of non-syphilitic parents, with ordinary acute otitis media catarrhalis in the first stage. What blow would he strike at the destructive processes which, if not arrested quickly, will inevitably impair the organ of hearing? I think that we should have crystalized views as to the blow we would deliver. It does not do to say, in general terms, that we would give mercury in small or large doses, or other remedies. What does he rely upon as being in his experience most effective? In a supposable case such as I have laid down, what would the gentleman do if he accepts the premises that the malady is like a bull in a china shop? I must say in all kindness and deference that his recommendations are not precise enough.

Dr. Sexton:—I think that I need not hesitate to say

what I should do in such cases. If I were asked to see an infant six months of age, I should first ascertain the infant's general condition. I would ascertain its general health; ascertain whether it had head-catarrh, whether it was subject to catarrhal inflammation generally. I should ascertain what the teeth were doing, for at that age we should expect active dentition. I should ascertain if there had been previous inflammation of the tympanum. If I found on examining the membrana tympani and the membrana flacçida, that behind either there was an accumulation that was not going to escape easily, as I said in regard to the membrana flacçida, I should incise the membrane and let it out. In the greater number of cases at this age, we find the drum-head already perforated before the case comes under observation. There may be congestion closing up the outlets so that the matter can not escape and we may have periostitis externa. Every case is to be treated according to the conditions present. I should give calcium sulphide if there were suppuration. If there was simple catarrh and the ear was running, I should give mercury.

In regard to the relief of the pain which keeps the patient awake at night, we must try every thing that we can, using mild measures at first. I should hesitate to give a hypodermic of morphia at first, but if the pain was not relieved, I should give a hypodermic.

Dr. Charles J. Kipp, Newark, N. J.:—I am surprised to hear nothing said of inflation of the middle ear. This very often relieves the pain. Although the books say that in inflammation of the tympanic membrane, the pain is increased, I have found that the pain is greatly relieved by this procedure.

In regard to the cases described by Dr. Sexton, in which there is in front of the membrane a protrusion, I find that an incision almost invariably gives relief to the pain, whether the protrusion is of the ordinary color of the skin or of a livid color.

Dr. Samuel Theobald, Baltimore:—Speaking of the relief of pain, no mention has been made of a remedy which I find extremely useful, that is, a solution of the sulphate of atropia. In just such a case as has been outlined by Dr. Agnew, the first thing that would occur to me would be to place the patient in a chair, incline his head to one side and pour into the canal a warm solution of atropia, four grains to the ounce. I have seen this, over and over again, give immense relief. In the case of a child suffering intense pain from otitis media after scarlet fever, the instillation of the solution of atropia has cut short the pain and the atropia being continued, in a short time the inflammation has subsided. That it will relieve the pain in a considerable proportion of the cases, there is no question. I do not depend upon atropia only in severe cases, but use it to relieve the pain.

Dr. Roosa has spoken of one measure to which I attach much value, *i. e.*, the use of a cathartic. I think that in these cases, if together with the instillation of atropia, a brisk cathartic containing a liberal dose of calomel, three to six grains, with rhubarb and scammony, is given, so as to secure three or four brisk actions, the inflammation will frequently be cut short. This treatment will often cut short just such a case as has been outlined here. Even in children I do not hesitate to give a brisk cathartic, but the strength and general condition of the child must of course be taken into account.

There is another remedy which I think has not been used by specialists, but which has been largely employed in Baltimore in suppurative inflammations generally, especially by Dr. Alan Smith. I refer to the pyro-phosphate of soda. It is given in fifteen grain doses every two hours. When four or five doses have been taken, a little nausea is produced, and with this the relief is apt to manifest itself. Dr. Smith has used it a great deal in carbuncle. I have

employed it in inflammation of the middle ear with threatened mastoid trouble, and I am convinced that it is of real value.

Another point to be borne in mind is that in all severe cases, the inflammation of the middle ear is really a periosteal inflammation. If therefore the symptoms indicate cerebral complication, and the fever is high, the administration of mercury is after all our great standby. Calomel is perhaps the best form in which to administer it and it should be given until some evidences of its action are manifested.

In regard to treatment, after the drum-head has perforated and the inflammatory symptoms are subsiding, I formerly employed powders under these circumstances, but of late I have used instead solutions of boracic acid. I have followed this plan of treatment in all recent cases, ordering a solution of from ten to fifteen grains to the ounce, and directing that the ear be syringed with it from one to three times a day, according to the amount of discharge. In this way we are more apt to get perfect healing without irregular cicatricial formations, causing subsequent trouble. I have also used cocaine for the relief of pain in inflammation of the middle ear, and in one case, that of a patient whose tympanum had been ruptured by a blow, and who was suffering greatly, the pain was relieved entirely in ten or fifteen minutes by a four per cent. solution of cocaine.

Dr. C. J. Blake, Boston:—There is one anatomical point which has not been mentioned in the paper. An examination of normal middle ears reveals in a larger number than might be expected, a reduplication of the mucous membrane in the upper portion of the tympanic cavity, extending along the line of the short process of the malleus. I have made a series of sections of the middle ear with particular reference to this point. I found in fifteen or twenty per cent. of more than a hundred ears examined, re-

duplications of mucous membrane running sometimes from the posterior inner wall forward, in some cases as far as the tendon of the tensor tympani and then reduplicating. Smaller reduplications occurred about the insertion of the short process, the incus and the stapes in the anterior portion of the tympanic cavity running forward. Reduplications of this sort serve to separate the upper from the lower portion of the tympanic cavity and become an important element in inflammation of the upper part of the cavity, serving to retain secretions.

In his paper Dr. Sexton has not included acute congestion of the upper portion of the tympanic cavity. This is a subject of great interest. We are apt not to differentiate these conditions because, as has been said, we see the case some time after the trouble has begun. I have lately been observing a series of cases of acute congestion of the upper portion of the cavity in which there has been a history of overstrain and nervous exhaustion. In these cases, the acute congestion came on rapidly and accompanied by severe pain, injection of the inner upper portion of the canal and redness and swelling of the upper portion of the membrane. These symptoms have suggested the acute pneumonias with precedent history of nervous exhaustion. In these cases the remedy is the one which nature has attempted to seek, that is, a free phlebotomy. I would make a free incision along the line of the posterior fold. In the majority of cases the result has been good. That this treatment is indicated, seems to be shown by the free bleeding which has often persisted sometimes for a period of twenty-four hours, with a corresponding diminution in the symptoms and improvement.

Dr. J. O. Green, Boston:—I have been much interested in these cases, particularly in the chronic cases where there is perforation of the membrane with chronic discharge, which we all know is particularly obstinate. I

have never been able to satisfy myself as to the cause of this chronicity. I have been much interested in hearing Dr. Blake's remarks, for I am satisfied from the general course of the disease that there must be something of that kind. What we need is a series of experiments on these cavities to see how we can get rid of this obstinate suppuration. In one of my cases, I can not see that any thing has been gained in three or four months. Sometimes there is caries and until this is gotten rid of, the suppuration cannot be checked. I believe myself that there are little pouches or something of that kind where the pus collects and decomposes and keeps up the inflammation, and in these cases we have got to have some method of opening these cavities and clearing out that secretion. By the most thorough cleanliness, the use of antiseptic and astringent solutions of alcohol, boracic acid and other preparations, I have succeeded in relieving some of these obstinate cases. The explanation of Dr. Blake is a very interesting one and I hope that he will give it to us more fully.

There is one question in regard to the use of these internal remedies on which we should all like to satisfy ourselves. In considering this question of inflammation and the influence of drugs upon it, we must remember how various is the pain of these inflammations and how the inflammation itself varies. It seems to me that if we took a number of these old cases which we see at all stages and omit all local treatment and give drugs, we should be able to determine the effect of the drugs. I have tried a good many cases in that way with calcium sulphide and with calomel, and the result has been absolutely negative. I cannot make out that the suppuration was influenced. Where local means are employed, the effect of the local measures cannot be separated from the effect of the drugs. I have been unable to convince myself of the favorable

action of calcium sulphide and calomel in chronic suppuration. In other inflammations where these drugs have been recommended, the same objection arises. If calcium sulphide will relieve the suppurating boils of external otitis, it will be a great thing, but we know how this disease varies. One patient will have two boils and that is the end, another will have a dozen, and a third will have one every week for six months, so that it is difficult to form any conclusions in this case.

Dr. E. Williams, Cincinnati: — Dr. Green has touched upon a point about which I have thought much for a long number of years, that is, certainty in medicine. If we want to get the bull out of the china shop, we do not want to go at him with pop-guns and red flannel, if we have a cannon and can shoot him in the head at once. We are so anxious to get him out that we put in a lot of things and when we succeed we don't know what did it. Another difficulty is that each individual is as different from all other individuals as one can be. He has constitutional peculiarities and peculiarities in the course of the disease. You have to know all about his condition, his family condition, his inheritance, before you can treat him with the best success. It is always a question whether it was this, that or the other medicine that gave relief, for we are disposed to practice the shot-gun system, because we can not afford to wait.

I remember a physician we had in Cincinnati, who always wrote his prescriptions in Latin and his directions in stilted English. He was called to a family of Spaniards, who did not understand much English. He prescribed for one of the young ladies a mass to be made into so many pills, "One to be taken three times a day in any convenient vehicle." The family were troubled about the vehicle. They got down their dictionaries and put their knowledge of English together, and got along very well until they

came to vehicle. They found that a cart, carriage, wheelbarrow and so on, were vehicles. After considerable deliberation, they came to the conclusion that the doctor meant that the young lady should hire a carriage, take a ride three times a day, and take the pill while on the way. She recovered, but it has always been a question whether it was the pill or the convenient vehicle that cured her. The older I get the more I believe in convenient, comfortable vehicles.

Dr. C. R. Agnew, New York:—I know that we are passing through a period of want of faith in remedies. I do not get a clear idea from what our colleague opposite (Dr. Green) says in regard to his use of mercury, how that remedy should be employed. He does not express it in his statements when he speaks of the use of mercury in suppuration. I think that we have no analogy in the field of medicine to lead us to suppose that mercury is of much value administered for mere suppuration anywhere, but I think that we have plenty of analogies for the use of mercury in these conditions of perivasculitis, or exudation such as we see in the early stages of otitis media acuta.

Dr. J. O. Green:—I was referring entirely to chronic suppuration.

Dr. Agnew:—I think that there is value in discussing a paper ad infinitum, so that we may get the essence of the subject. I think that mercury is of no value in chronic suppuration. I got my idea in regard to the use of mercury in acute otitis media from the case of my friend Dr. Leaming, who took thirty or forty grains of calomel for pleuro-pneumonia. The day after I heard of his case I had a cataract extraction in a man who had lost one eye, some time before, in the hands of a good surgeon. I operated at 2 o'clock. At 5 I examined the eye again, as he had had increasing and severe pain in the eye since the operation. I found the anterior chamber of the wounded eye already

muddy, and on the edge of the corneal wound a little dough-like incrustation of partially elaborated lymph. The iris could not be seen distinctly on account of the muddy condition of the aqueous humor. Chémosis was marked. I gave him fifteen grains of calomel and the next day considered the eye comparatively safe. How that is to be explained, I do not know, but one authentic, clinical fact is of more value than any amount of theory. We must have faith and we must try to get distinct crystalized ideas, as to the indications and the possible remedies.

Dr. J. O. Green:—So far from differing with the last speaker, I have for a long time, especially in young children, used calomel in the early stage of inflammation. I referred to cases of chronic suppuration and mercury was used because it had been spoken of as of service. As I understand Dr. Agnew, he refers only to the acute stages.

Dr. Samuel Sexton:—I think that there is a little misunderstanding on the part of Dr. Green and some others. I have never recommended, nor have I ever seen it recommended, to give mercury or calcium sulphide in chronic cases ordinarily. In some cases of disease of the bone, calcium sulphide has been highly recommended and it is valuable. I have employed these remedies for many years, at the Eye and Ear Infirmary and in private practice, and I am convinced of their beneficial action in certain cases. On the whole, I think that these internal remedies are of great service and I should rather abandon almost everything else than give them up entirely. If Dr. Agnew will allow me the use of his bull for a moment, I would say that the natural tendency of the laymen would be to hit him on the head with a cannon ball, but if we were to study the vital parts of the bull, we would find that we could dispose of him with a very small instrument.

Dr. Herman Knapp, New York:—I beg to express my opinion that I do not attach so much confidence in the ben-

eficial action of large doses of calomel in warding off an impending suppuration. Cases in support of this belief are not unknown. In certain cases of extraction of cataract, there is most intense pain during the first four or six hours. When we, during that time, remove the bandage and inspect the eye, the edge of the upper lid is swollen, a stream of hot, somewhat milky looking tears gushes forth, the conjunctiva is red, the cornea is hazy, and all looks as if violent suppuration were imminent. We cleanse the eye, employ an indifferent or no remedy, bandage the eye again, and in half an hour or somewhat longer the pain subsides and the recovery progresses without any other disturbance. In such cases the question arises again: What acts?

TREATMENT OF CHRONIC OTITIS MEDIA.

By W. W. Seely, A. M., M. D., *Cincinnati, O.*

The appalling number of cases of chronic non-suppurative otitis media renders it altogether the most important field for study in otology.

Its treatment in a rational manner began, of course, with catheterization of the Eustachian tube.

For quite a number of years the catheter almost supplanted all other interference.

To supplement the action of the forcible introduction of pure air, medicated air and vapor and the injection of various sorts of fluids (irritant, astringent, alterative) were resorted to.

Of late years more and more attention has been concentrated upon naso-pharyngeal affections as the starting point and the continuing cause of this trouble.

And right here it would be important to know what effect, if any, the ordinary treatment of pharyngeal troubles has in starting up the affection under consideration. We are all perfectly cognizant of the disastrous results following treatment of nasal catarrh and every one must be perfectly aware of the care and study it requires to so treat the nasal and naso-pharyngeal spaces, as to benefit the tube and middle ear, and how much more care is required not to do positive harm to them. I have seen case after case of the most obstinate tubal and middle ear trouble (chronic) directly dependent upon nasal and naso-pharyngeal treatment. I have myself, over and over again, aggravated

matters instead of improving them, and that too with all the care I could exercise. Now if one whose whole attention is directed to the ear, and hence is in a condition to appreciate the slightest damage by or failure in the treatment, how much more is one liable to do harm who is taking little or no thought of these parts?

We all know that the nasal douche has been virtually discarded by aurists, even also the once apparently innocent post-nares syringe, (with which I have often blocked an Eustachian tube).

There are cases even in which inflation by any method, especially with the catheter, not only does no good but positive harm. In fact, a careful study of this trouble over a very long series of years has convinced me that it is a most complicated and delicate chapter. If it is so complicated and delicate, and I fancy no one will dispute the statement, it has always been a mystery to me why some of the best men in the profession turn over the treatment not only to unskilled hands, but even to the patients themselves. I have met with a few cases in which the catheter has been put by aurists into the hands of the patient, I need not say with what result.

Both patient and physician must be taught that the Eustachian catheter, like the urethral, is an instrument as potent for evil as good.

The profession are fast getting the idea that all ear cases should be catheterized. A ludicrous illustration of this statement came under my observation while preparing this paper. A very reputable physician rather triumphantly informed me that he had been inflating his ears for quite a while with the catheter but he was still deaf and wanted me to see what the trouble was. It was ear-wax! It is certainly no unusual thing for the balloon to be put into the hands of patients and into the hands of parents.

These cases require a vast amount of time, care and pa-

tience, but these are not sufficient grounds for the slurring they receive. The percentage of these cases, even when of long years' standing, that are not more or less amenable to treatment, is exceedingly small. Unfortunately, as yet our means of diagnosis are too imperfect to inform us as to the length of time treatment will be required and as to how much benefit will accrue. There is no special agreement even as regards the means to be employed nor as regards the manner of treatment, whether continuous or interrupted. We constantly meet with the most discouraging expressions, verbal and facial, from this class of patients. They are in the most discouraged state of mind and extremely hopeless of treatment doing any good. The majority perhaps, when they hear that no very favorable prognosis can be made in regard to the relief of the annoying tinnitus, are ready to abandon treatment.

I am fully persuaded if all middle ear troubles could be ushered in with tinnitus it would be a most fortunate thing for this class of patients, as we would then see them early.

Of course *it is not the tinnitus that is so discouraging and annoying, but the cerebral state due to the ear trouble.*

Nothing is more common than to hear ear patients after inflation, remark, "Now my head feels better." If my experience has taught me anything it is that this mental depression can be relieved, so that the tinnitus is no longer disturbing, even when no perceptible improvement has taken place in the hearing. The great difficulty in all these cases is in tiding patients over the first few weeks or months.

It is a great mistake to think that because the Eustachian tubes are closed, only catheterization will open them. Over and over again I have found some applications of vaseline and boric acid, or what is better, (since we have such impure acid preparations of vaseline), the yellow oxide of mercury and vaseline (10 grains to the oz.) used

through the nostrils, open tubes when catheterizations had little or no effect. In this connection I would say that salves for me have almost, if not quite, superseded all other applications for nasal and naso-pharyngeal troubles.

My clinical studies will, I think, justify the following conclusions:

1st. Only experience of sufficient length of time (often lasting over months) in each case can determine whether treatment shall be continuous (daily) or interrupted, *i. e.*, perhaps daily for a few weeks, followed by an interruption of some weeks or months.

2d. Only experience in each case can inform us whether treatment is to be entirely directed to the middle ear, or entirely to the naso-pharynx, or combined against both.

3d. Only experience in each case can inform us whether injections into the cavitas tympani are called for. Under this head I would say that direct medication either of the middle ear or naso-pharynx as routine treatment is unwise till simple inflation has failed.

4th. Mechanical dilatation of the tubes is rarely necessary or desirable. I would remark here that only in extremely dry states of the tube is dilatation followed by much success.

5th. Hearing tests are not reliable and hence patients with great deafness, great loss of bone-conduction, &c., should not be sent away till the "test by trial" has been thoroughly gone through with.

6th. Simple inflation failing, the greatest attention should be given to the naso-pharynx, even though it is in an apparently fair condition.

7th. Syringing, douching and swabbing the naso-pharynx should be abandoned.

THE RELATION BETWEEN CHRONIC OTITIS MEDIA CATARRHALIS AND CHRONIC RHINITIS.

By Charles H. Burnett, M. D., *Philadelphia.*

Chronic catarrh of the middle ear—*i. e.*, otitis media catarrhalis chronica (non-suppurativa)—is invariably associated with some form of chronic rhinitis. The latter is usually of the hypertrophic form, since only about four per cent. of all cases of chronic rhinitis are of the truly atrophic form. Hence, in rhino-aural diseases, less than four per cent. will be strictly of the atrophic form, because all rhinal diseases are not followed by aural disease. In my investigations, by applying the term atrophy in a wider sense, so as to include fibrous degeneration and sclerotic catarrh, as I shall show, I have found considerably more than four per cent. (nearly 14 per cent.) of rhino-aural cases, which may be classed under the atrophic form. It will be found that the catarrhal processes in the Eustachian tube and middle ear proceed from those in the nares and naso-pharynx, and hence partake of their nature, or, that they occur simultaneously with them and are relievable by treatment of the nasal disease; therefore, all cases of chronic naso-aural catarrh—*i. e.*, catarrh of the middle ear—may be divided into two classes, viz., the *hypertrophic* and the *atrophic*. Since atrophic rhinitis may be further divisible into the strictly atrophic, in which there is shedding of the epithelium and exposure of the basement-membrane, and those in which there occurs a

fibrous degeneration, a form of atrophy subsequent to a hypertrophic process in the cavernous tissues of the nares, it will be found that the atrophic division of naso-aural catarrh is thus further subdivisible, making, as I have thus intimated, the atrophic class more numerous than it would be if limited entirely to the strictly atrophic form of nasal disease. It must also be borne in mind that, though all middle ear catarrhs are associated with chronic rhinitis, it is by no means true that all cases of chronic rhinitis cause chronic aural catarrh.

There is constantly observed a train of symptoms in the middle ear and nares common to the hypertrophic class, and also certain symptoms common to these parts in the atrophic form. It is my object at this time briefly to point out these common and consistent symptoms, to try to discover what other aurists have observed, and to suggest and elicit modes of treatment of these numerous and important cases of aural disease.

It may have been observed that I have said nothing about the faucial and pharyngeal symptoms in chronic aural catarrh. It is because the nasal symptoms are so much more important—because, in fact, the pharyngeal symptoms, in comparison with the nasal, are unworthy of consideration as causative elements in aural disease.

In order to study the relation between chronic nasal and aural catarrh, I have taken the last fifty-five consecutive cases of so-called chronic catarrh of the middle ear, as they have presented themselves to me in private practice, and I have found that forty-seven of these presented well-marked symptoms of hypertrophic nasal catarrh, and eight cases presented equally distinct features of atrophic rhinitis as previously defined.

The nares in the first group present the well-known appearances ranging from congestion to that of engorged and enlarged mucous cushions upon the turbinated

bones, usually the inferior ones, both anteriorly and posteriorly. These are soft in the early stages, but grow paler and harder in the more chronic forms. The hypertrophy may extend to the mucous membrane on the septum narium. There may also be enchondromata and osteomata in such cases.

Those in the first category, the hypertrophic form, so far as concerns the fauces, present chiefly an active follicular pharyngitis; next in order of frequency, follicular pharyngitis undergoing retrogression towards atrophy; next, a relaxed condition with incipient fibrous degeneration, and in some few cases, especially in children, a pharyngitis with enlarged tonsils, producing mouth breathing. In some few cases the fauces are unaffected.

Tinnitus aurium is not a pronounced symptom in this form of chronic aural catarrh, it may be absent, and it rarely becomes annoying; when it occurs it is of a mild type of the hissing quality. The Eustachian tube is less permeable (from the hypertrophy) than in the atrophic and sclerotic forms, as will be shown later. The hearing is not so profoundly affected as in the atrophic class of aural catarrh, and when impaired is much more amenable to treatment.

The appearances of the membrana tympani are very variable. None of them are sharply peculiar to the hypertrophic form of naso-aural catarrh. In this form of chronic catarrh of the middle ear, both the malleus and the membrana tympani may be found to be immovable under the pneumatic speculum, or the membrana may rise and fall beneath such inspection, the malleus remaining fixed. In fourteen cases the membrana was opaque without retraction in both ears. In three instances, one ear being unaffected, the membrana in the deaf ear showed no pathological change. In ten cases the membrana was retracted and opaque. In five cases the membrana was

thinned and retracted and the incus was visible. In seven instances the membrana tympani showed no abnormality, but the hardness of hearing was marked. In five instances the membrana was white, thick, and retracted, and in these cases the tinnitus was most marked. It will be shown later that this latter appearance of the membrana is more characteristic of the atrophic form of aural catarrh, in which also tinnitus is a constant and marked symptom. In two cases, (associated with enlarged tonsils and mouth breathing in children), the membrana was red and retracted, showing a hypertrophic process in the tympanic cavity. In one instance the membrana tympani was flaccid and thin.

In the *atrophic* class of chronic aural catarrh, the nares are atrophic, their capacity is increased, the mucous membrane over the turbinated bones and septum is pale, dry, and shining, or varnished in appearance in the truly atrophic cases, and in the others the mucous membrane is pale and shrivelled with evidences of the previous existence of an hypertrophic process. There is further in the atrophic class a tendency to inspissation and retention of mucus and consequent ozœna. The atrophy is often so great as to permit an easy view of the motions of the soft palate during inspection by anterior rhinoscopy. The pharynx too, is atrophic, or exhibits a tendency towards that condition, having a glazed or varnished appearance, especially on the posterior wall. In the sclerotic degeneration, also placed in the atrophic group, the fauces may show a fibrous degeneration and sclerosis.

Tinnitus aurium is a most pronounced symptom, and at times of the most distressing quality, in this class of naso-pharyngo-aural catarrh. It is in this group that we find all the distressing cases of tinnitus aurium of the hammering, sawing, harsh quality, associated often with a tendency to nausea and vertigo. In these cases I have observed

a constant and curious condition, viz., undue and often excessive patulence of the Eustachian tube. It seems as though the atrophy and consequent widening seen in the nares in these cases, had extended to the Eustachian tube. Inflations, therefore, are disagreeable and often painful, and upon auscultation the air is heard to rush into the middle ear. It has been claimed by some observers (Rüdinger and others), that a sudden, undue, and continued patulence of the Eustachian tube causes peculiar and disturbing subjective sounds in the ear. Some such connection may exist between the excessive tinnitus and the constant atrophic widening of the Eustachian tube in these cases. But, whether the Eustachian tube be less or more closed than normal, resonance of the ear is altered and so-called subjective sounds become audible and annoying. The hearing in these cases is most profoundly affected and least remediable.

In the atrophic aural catarrhs the membrana tympani is more uniform and consistent in its pathological appearances than in the hypertrophic forms. It is either thick, white, and retracted, or it is thinner, but still white and retracted, and in the latter state the incus becomes plainly visible. In those cases in which the membrana is thick, white, and retracted, the precedent hypertrophic process has been most probably excessive, whereas, in the form with the thin and retracted membrana the process probably has been chiefly atrophic from the outset. In one atrophic case the membranes were thick and cutaneous in appearance, and exhibited perforations with cicatrized edges.

Treatment.—The local treatment of these cases, in order to be efficient, must be directed chiefly to the nares. Since the catarrhal process in the ear has its origin in the catarrhal process in the nares, amelioration and removal of the latter will be followed by improvement in hearing, and if the organic changes in the delicate parts of the middle

ear have not been too profound, by removal of the deafness.

It will also be found that tinnitus aurium in these cases of catarrhal disease of the Eustachian tube and middle ear, is most relieved by treatment of the catarrhal processes in the nares and naso-pharynx. This fact throws force into the argument that tinnitus aurium is a truly objective sound, induced by increased vascularity and the motion of the blood in and near the sound-conducting parts of the ear.

As the congestive state of the vascular tissues near the ear is overcome by treatment, the tinnitus will be found to diminish, and this desired end is often best brought about by local treatment of the nares and naso-pharynx.

In some instances the appearance of the membrana tympani becomes, under treatment of the nares and naso-pharynx, nearly normal in every way. Whereas, all endeavors to treat chronic catarrh of the middle ear by applications to the external ear surface of the membrana, are worse than useless, since they distort and disturb the membrana and increase the deafness and tinnitus.

Treatment of the middle ear by inflations alone, or by applications to the throat. and by inflations without nasal treatment is either useless or of far less value than naso-aural treatment. In the hypertrophic form of naso-aural catarrh, the treatment may be briefly defined as cleansing and astringent; while in the atrophic form it may be defined as cleansing and stimulant.

In the first class there may be placed the use of sprays of Dobell's solution in its weakest form, and solutions of iodide of zinc, and carbolate of zinc, not more than two and a half grains to the fluid-ounce in strength. To the fluid-ounce of water may be added two fluid-drachms of Listerine in the combination with sulphocarbolate of zinc. In the milder forms of nasal catarrh, an excellent spray

may be found in equal parts of the distillate of witchhazel and water,[1] and in children's hypertrophic catarrhs the spray of fluid cosmoline (Petroleol) is most desirable as bland, alterative, and manageable, as it does not flow into the fauces and alarm the patient. In the denser, more chronic, hypertrophic state in the nares, the diseased tissues may be touched with the following preparations of iodine, conveyed to them on cotton by the cotton-holder, under perfect illumination of the nares by the forehead reflector:

℞ Iodinii cryst. . . . . gr. viij.
Potass. iodidi . . . . . gr. xxxviij.
Glycerinæ . . . . . f℥vj.v—M.

In applying this to the inferior turbinated bones, great care should be taken to make the applications to their upper surfaces, and not to touch their lower edges, or the floor of the nares, as these parts are most sensitive. With these precautions the applications may be carried to the pharynx through the nares. Should smarting be brought about by these applications of iodine to the nares, it may be relieved by the aforesaid spray of fluid cosmoline. When this iodine solution loses its power to excite absorption, stronger iodine solutions may be used, as, for example, equal parts of tincture of iodine and glycerine. These applications shave down, so to speak, the hypertrophy. *No* form of nitrate of silver application is tolerated in the nares in the hypertrophic form of nasal catarrh.

The throat symptoms can be combated by suitable gargles or by direct applications of preparations of tannin or chloride of iron, made by the cotton-holder under illumination from the forehead mirror, directly to the diseased spots, and not by an indiscriminate swabbing, which is as injurious as it is unskilful. The day has gone by, thanks

[1] This may often be used with advantage, still weaker.

to special surgery of all forms, when diseased tissue is reached by all-embracing applications, which excoriate and cauterize healthy and unhealthy tissue alike.

After suitable applications are thus made to the nares and fauces, the tympana should be inflated. If the catheter is to be used, it is best done before applications are made to the nares, as saving just so much additional manipulation after local medication.

In the *atrophic* forms of naso-aural disease, the first consideration in treatment is the removal of the inspissated matters, crusts, scales, etc., from the nares; this may be effected by the nasal douche, but I prefer other methods. On the whole the best results are obtained by softening sprays and subsequent removal of scales or crusts by proper forceps. After the parts are cleansed and exposed, the mucous membrane may be stimulated by nitrate of silver in powder[1] or in solution. The strength of the latter should never exceed 5 grains to f℥j of water. Preparations of sulpho-carbolate of zinc and Listerine are also efficient as stimulants in these cases. The general rules to be observed in treatment of chronic naso-aural catarrh are: 1, in the hypertrophic forms, to allay engorgement, to soothe, as it were, the injected and inflamed parts; and 2, in the atrophic forms, to stimulate the mucous membrane of the nares and fauces. All of these methods must be conducted within reasonable limits.

Another important point is to bear in mind the naturally erectile nature of the tissues in the nares and naso-pharynx, and their consequently easy excitability, and also that osmosis is easily effected in these parts.

Hence, in order to prevent this, a solution containing salt, for example, should not exceed 56 grains to the pint. If greater than this, exosmosis ensues and the tissues are drained too much; if less than this, endosmosis occurs, the

[1] Dr. Seiler's formula: ¾ gr.—15 gr. to 154 gr. powdered starch.

tissues become distended, and pain and discomfort ensue. And this holds good for all saline solutions.

I have thus sketched very briefly the general plan of treatment in naso-aural catarrhs. When the nasal disease of either form demands a more surgical treatment, such as the ablation of hypertrophy, the use of the galvano-cautery, or the removal of diseased and necrotic bone, the affection has passed into the territory of the rhinologist.

It will be found, however, that while all chronic, aural catarrhs are associated with nasal catarrh, all cases of chronic rhinitis are not followed by chronic aural catarrh, and it will also be found that the worst cases of chronic rhinitis are usually not associated with aural maladies, and that the rhinitis of aural diseases is of a comparatively milder form than that found in nasal diseases alone.

A word of caution should be given here in relation to the use of the galvano-cautery in the nose. It, like the nasal douche, is open to the criticism that, in some cases, it excites inflammation in the middle ear. Very recently I have seen two cases of acute otitis media following the use of the galvano-cautery in the nares for the relief of hypertrophic nasal catarrh. I know this is a small number of cases of inflammation attributable to the use of an instrument so frequently employed not only with benefit to the nares, but without simultaneous irritation to the ears, but in the cases I report I can see no other explanation of the aural inflammation except in the irritation of the naso-pharynx, Eustachian tube, and tympanum, set up by the galvano-cautery.

Conclusions.—1. That there is a constant causal relation between chronic nasal and chronic tympanic catarrh, in which throat and faucial diseases play only a subordinate part, and this naso-aural catarrh is found under two chief forms, viz., the hypertrophic and the atrophic.

2. It follows that, owing to this close connection be-

tween the nose and the middle ear, that treatment of chronic catarrh of the middle ear, to be efficient, must be coupled with that of the coexistent and causal rhinitis, and that treatment of the throat alone is of little avail in chronic aural diseases. Treatment of, and by the way of, the external ear is of course useless. It is also shown that tinnitus aurium from catarrhal causes is best overcome by treating the chronic rhinitis.

3. Since the appearances of the membrana tympani are so variable in the hypertrophic form, nothing can be predicated of the tympanic disease by simple inspection of the membrana. In the atrophic form of chronic aural catarrh, the appearances of the membrana being more consistent and invariable, the surgeon can predicate more of the tympanic disease from inspection of the membrane, viz., that it is sclerotic in form. From this variability in the appearances of the membrana in the hypertrophic form of aural catarrh, it follows that changes in the membrana taken alone, are of little moment respecting the hearing. The lesions most competent to induce acoustic disturbances are apt to be situate upon the ossicula or upon the inner tympanic wall near the fenestræ.

4. It behooves the aural surgeon, therefore, to inspect and treat the non-surgical forms of nasal catarrh as they occur in chronic catarrh of the middle ear, laying more stress on the condition of the nares than upon the fauces, so far as any causal relations between these parts and the deafness are concerned.

DISCUSSION.

Dr. O. D. Pomeroy, New York:—It seems surprising in these days that reference has not been made to enlargement of the tonsils and the presence of adenoid growths in relation to otitis media.

Dr. C. H. Burnett, Philadelphia:—That is perhaps an omission. In my experience, I have not been called on so frequently to treat naso-pharyngeal disease as I have been to treat nasal disease in aural affections. Wherever the so-called adenoid growths exist in the naso-pharynx, they are often overcome by the same treatment as is applied to the anterior nares. The sprays are applied by the surgeon as often as three times a week. The manner of the treatment I should have stated more specifically, and I was reminded of that by a remark in the previous paper. So far as my experience goes, the treatment of the adenoid growths is usually accomplished at the same time and by the same means as are directed to the anterior nares, except where iodine must be carried by the applicator behind the velum. I wish it to be understood that I did not allude to those intensely dense hypertrophies which are snared off by the galvano-cautery or Jarvis' snare in the hands of the rhinologist. Those cases are not accompanied by aural disease, as a rule.

Dr. Charles J. Kipp, Newark, N. J.:—I would ask in regard to the cases of hypertrophy, did they occur in adults or partly in children?

Dr. C. H. Burnett:—There were two cases of mouth breathing and simple hypertrophic catarrh in children, among the cases tabulated in my paper.

Dr. Kipp:—In adults the adenoid vegetations are apt to disappear, but in children they are frequently found in connection with the hypertrophy of the nasal mucous membrane.

Dr. C. H. Burnett:—I think that they are apt to disappear in children. I have not found it necessary to ablate them. They usually yield readily to the anterior nasal treatment.

Dr. C. R. Agnew:—I would ask Dr. Seely by what method he applied salves to the naso-pharynx? If I gave close attention to his paper, I failed to hear what he substituted for the use of the nasal syringe besides the suggested use of salves. How does he apply salves? How does he secure their application to the entire surface involved in the naso-pharyngeal malady?

Dr. W. W. Seely, Cincinnati:—In answer to Dr. Agnew, I would say that to introduce the salves into the nostril, I simply make use of Bowman's probe with cotton. I take a small quantity of salve upon the cotton and pass it as far as possible upwards and backwards into the nostril. As it melts it goes over exactly the point where we wish it. It stays longer on the parts than other applications. As the vaseline melts, it leaves what it contains upon the surface. It has always been a question with me how to treat the naso-pharyngeal trouble so as to benefit the middle ear trouble. I presume that every one has seen that treatment has rather done harm than good. He who has attempted to open the Eustachian tubes by applications around the tubes, has certainly often found them close up more and more rather than open. Certainly every one has seen a large number of individuals with nasal catarrh where treatment of this has caused the ear affection. If we are able to devise some means whereby we are certain of doing no harm, we shall have made a great advance.

Dr. C. R. Agnew:—I would ask another question. He says that the syringe and douche should be abandoned in the treatment of the naso-pharynx. Does he include in his objection the use of sprays? Does he substitute the use of salves for sprays?

Dr. Seely:—Yes, sir. I think that they are apt to do as much harm as the syringe or nasal douche.

Dr. Agnew:—I hope that our colleague will not feel offended if I take issue with him. I know how a man may acquire a dexterity that others do not possess. There appears to me to be an anatomical objection to the thorough application of salves by such an instrument as Bowman's probe. If we recall the multilocular and the cavernous form of the nasal cavity, we shall readily see that to apply a salve to the whole or a considerable part of the diseased surface by a probe is a practical impossibility. In the treatment of skin diseases, where we desire to make topical applications, it really goes without saying that the remedy should be applied to the whole of the diseased surface. Adopting the view just expressed by Dr. Burnett, and as held by all otologists, that there is a close relation between naso-pharyngeal diseases and middle ear affections, if topical remedies are to be applied, it is important that they should be applied to as much of the diseased surface as is possible and safe. I respectfully submit that it is impossible for me to apply salves thoroughly by the method which Dr. Seely proposes. I do not mean to say that Dr. Seely does not obtain good results; he may have other methods which he has not thought it proper to describe in this paper, which would increase the efficacy of his topical remedies.

I have used the nasal syringe for twenty years and I am not prepared to accept the law that it should be abandoned. I have used it instead of introducing the Eustachian catheter, douching the posterior nares with a hot solution of some alkali, and thus causing free exosmosis from the surfaces at the mouths of the Eustachian tubes. By this method I have been able to open the Eustachian tube in very many cases and to avoid the use of the catheter. I am not prepared to abandon the posterior nares

syringe. I cannot accept the law as it has been formulated by Dr. Seely.

I am more disposed to accept the views of my colleague on the left (Dr. Burnett) although I think that he may lead us to expect more from treatment of chronic cases than we shall obtain. I am sorry that more reference has not been made in his paper to hygiene. It is important that the whole question of regimen should be considered. The habits of living, the diet, the dress, exercise, bathing and use of friction should be regulated. The selection of domicile should be thought of. The patients should be taken from badly drained houses and low levels and put in better sanitary location. People tormented with tinnitus and driven to suicide, who live in the country, may be brought into the noise of the city. There is a long range of questions which might have been brought into the paper, but the matter of the hygiene of the ear should have come in as a most important consideration.

Dr. D. B. St. John Roosa:—I would ask Dr. Seely to read his first and fifth conclusions.

Dr. Seely:—

1. That only experience of sufficient length of time (often lasting over months), in each case, can determine whether treatment shall be continuous (daily), or interrupted, i. e., perhaps daily for a week followed by an interruption of some weeks or months.

5. Hearing tests are not reliable and hence patients with great deafness, great loss of bone conduction, etc., should not be sent away until the test by trial has been gone through with.

Dr. Roosa:—I think that almost all that Dr. Agnew has alluded to, important as it is, goes without saying, but I venture to refer to it again. The discussion is perfectly free and frank, and without a tinge of personality. I take issue with the drift of these two papers, not necessarily with the views of the second paper, although I take pretty strong issue with the views of the first paper. If any surgeon or

physician came here to-day and listened to these two papapers (I am far from saying that such was the intention of the authors), he would be led to suppose that we had some means of curing a large percentage of the cases of chronic inflammation of the middle ear. We all know that we have not. As a matter of fact, we do not cure them and we alleviate very few by local treatment; and here comes in the point to which Dr. Agnew has referred so well that nothing more need be said. In these chronic cases of suppurative trouble even, including nasal catarrh; in all that large class, Dr. Agnew's views seem to me to be correct. Hygiene comes first of all and should be dwelt upon, if we do not wish to lead the profession into wrong notions as to the position.

It seems to me that we, as otologists, would serve the profession better by choosing such subjects as that of the paper first read, relating to disease susceptible of cure, and which, if not relieved, are followed by terrible consequences.

The first proposition of Dr. Seely is one that I think should not be adopted without mature consideration. I think that the reproach of otology, from which we are now beginning to emerge, was that all cases that came to our mill were grist. We treated them all until we found out whether they were curable or not, and then let chronic catarrh go without curing it. We should now have exact knowledge enough, to know within a few days whether a case is susceptible of relief by local means and whether we are justified in going on with the treatment. I do not stand alone in this view. Some of the most accomplished men in this country have said to me, "What you cannot accomplish with iodine and glycerine and proper hygiene in chronic naso-pharyngeal catarrh, you cannot accomplish with anything else." That is the established opinion of some and it is my opinion. I believe that the naso-

pharynx and the ear are treated too much. I think that the views here formulated should not be adopted without consideration. We should not treat the case for weeks before making up our minds whether or not it is a case to be treated.

Now in regard to the fifth conclusion, there I certainly think there is an error. Where I find a patient with diminished bone conduction, so far from going on and treating that patient I let him severely alone. There I believe the exactitude of our science is coming in. We are learning what cases we can dismiss without treatment. I believe that diminished bone conduction means almost universally in chronic aural disease, affection, either primary or secondary, of the acoustic nerve. There is one instance where we can dismiss the patient after a thorough examination, which will at the most require many days. I am sure my friends will not think that I ought to make apology for such frank discussion of their papers. I believe that Dr. Seely has instructed us in the use of salves, both for the eye and nose. I am arguing only against the tone of these papers and the want of emphasizing the inherent incurability of a large proportion of cases of chronic non-suppurative disease of the middle ear and the failure to draw attention as Dr. Agnew has indicated so well, to the hygienic conditions.

Dr. E. Williams, Cincinnati:—I want to speak of catheterization in reference to cases to decide whether it is better to try treatment or whether it is useless. I have many of these cases who come stating that they have been to doctors all over the world and want to know whether or not they can be cured. The public generally have an idea that doctors have the knowledge of secrets which they can get at with money. I try to counteract that feeling as much as possible, and try to say to patients, your case is curable or your case is incura-

ble. It is a very important point to which Dr. Roosa has called attention. I have been for long years in the habit of using the catheter in certain cases, — not with indiscretion, but in certain cases where I think that it is indicated. Not only that, but I have been in the habit of passing a flexible bougie through the catheter into the Eustachian tube and sometimes quite into the middle ear. I ask the patient: "Do you feel it in the throat or in the ear?" If he says that he feels it in the ear, I know that it is in the Eustachian tube. If it is felt in the throat, I am sure that it is not in the tube. In certain cases of stricture of the Eustachian tube I am quite sure that the bougie is useful and then inflation afterwards. I can speak personally of my own case. Once in a while one or other ear gets a little deaf. The catheter does not succeed in getting air into the tube, but when the bougie enters, air passes through and I feel relieved. This has been my experience in many cases. I have done that for many years. When I speak of catheterization, I mean its use by experienced hands. In some cases no good can be done, but in those cases the absence of bone conduction, the great deafness which has come on slowly, without any violent symptoms, will indicate their nature. I am in the habit of making thorough exploration and when I am satisfied that no treatment will do good, I do not give placebos. We want to be honest and frank with our patients so as to relieve the community of the idea that doctors know secrets which can only be gotten at with plenty of money.

Dr. Lucien Howe, Buffalo, N. Y.: — Did I understand Dr. Seely to say that he does not give Politzer's bag into the hands of the patient or his friends?

Dr. Seely: — I do not give the balloon into the hands of the patient.

Dr. Howe: — I often ask patients to get a bag and then teach them how to use it. I find that they do so with good

result and it is a matter of great convenience to them, particularly those coming from a distance. In that respect my experience differs from that of Dr. Seely.

Dr. H. Knapp, New York:—In regard to the use of salves, I should like to make a remark. I have lately been troubled with a catarrhal affection. I fully appreciate the remarks of Drs. Agnew and Roosa. Especially in the stage of convalescence, a little imprudence or a falling temperature, immediately stops up the nose. If these causes are avoided, I pass the night without much difficulty. In regard to hygiene, if I go into a pure atmosphere, neither too hot nor too cold, the trouble gets better as if by enchantment. I would condemn violent measures. There are certain remedies, however, which act more or less like improved hygienic conditions. One of these, which at the recommendation of Dr. Lincoln I have been using of late, is a salve of 0.06 iodoform to 15. of vaseline. It is applied to the nostrils with a brush at bedtime. The volatile iodoform acts on the mucous membrane through the whole night, eases breathing very much and seems to have a decided curative effect.

Dr. J. A. Andrews, New York:—I have found the air-douche very serviceable for clearing the nasal passages in the case of children. Struma as a basis for nasal catarrh in children has not been alluded to, but certainly deserves consideration in the treatment of this disease. If such patients can have plenty of nutritious food and proper hygienic surroundings they certainly get well without medicine,—although in such cases I have been accustomed to place some reliance in a combination of iodide, chlorate, and bicarbonate of potassa. It is easier to furnish such patients with medicine than to enforce directions for proper personal and domestic hygiene; but patients are not usually made to feel that pure air and good food are more important than medicine, consequently they are just as much

too much devoted to the latter as they are neglectful of the former. Salves applied to the nasal mucous membrane are of real value in the cases to which I allude, and it seems to me that a protective ointment consisting of vaseline alone is generally as serviceable as one that has been medicated.

Dr. Charles H. Burnett, Philadelphia: — I should like to say a word in conclusion. I cannot refrain from saying that the remarks of Drs. Agnew and Roosa have taken me a little by surprise. Of course the value of hygiene would not be questioned. It may be remembered that the cases alluded to in this paper were taken from private practice and occurred among people living in the best hygienic surroundings. So far as dispensary patients are concerned, in Philadelphia even the poorest family lives almost always in its own house, but if their hygiene is faulty, it is a matter not easily overcome. Hygiene has not been neglected in private practice and in public practice cardinal suggestions have always been given. This paper was prepared to be read before the American Otological Society, and not with a view to specially influence the general reader.

I should like to ask Dr. Roosa if he has tried the method which I have mapped out? If he has not, his criticism is perhaps not altogether deserved.

Dr. D. B. St. John Roosa: — I think that my friend labors under some misconceptions as to the purport of my criticisms. I was criticising the impression which the paper would have on physicians, no matter if the paper was written for us, — the impression it would have on those who look to us for instruction. I am utterly unaware of anything that would lead the gentleman to suspect me guilty of making any insinuation against his mode of practice. I have tried all the methods of practice that I have been able to learn about in the text books, but I was not speak-

ing about that subject at all. If I have said anything that would lead to the suspicion that I was making unfair criticisms, I would apologize in an instant. I was simply making a full and frank discussion of this important subject.

Dr. C. H. Burnett: — I felt that the method as I have mapped it out could not have been tried. I do not think that we are justified in dismissing a case of chronic aural catarrh after seeing it once or twice. The method which I have sketched has not been tried solely by myself. It has been tried by others in Philadelphia with success. I feel sure that by a conservative treatment of the nasal passages something can be done for cases of deafness that have hitherto gone without treatment. I do not think that we can decide from the tuning fork whether our treatment is going to do good or not in chronic aural catarrh.

Dr. W. W. Seely, Cincinnati: — There are several points to which I would like to allude. In reference to the anatomical objection of Dr. Agnew, I would ask if he has tried the method of using salves in the nose to see whether the anatomical difficulty is as great as he thinks it is?

Dr. C. R. Agnew: — Yes. If there is affection of the turbinated bones, they do good, but my difficulty is to reach the whole area of the nares. The exhaling salves mentioned by Dr. Knapp do good.

Dr. Seely: — I would simply state that since I have adopted the use of salves as a routine practice, I have had more satisfactory results than from any other form of remedies. I admit that there is a certain amount of theoretical difficulty, but in using them to a large extent, the theoretical difficulties almost entirely disappear.

Now I come to *the point* of the paper, and it is the point which I want to bring out most strongly. I am glad that Dr. Roosa has seized upon it. With especial reference to

the first conclusion, which is "That only experience of sufficient length of time (often lasting over months), in each case, can determine whether treatment shall be continuous, (daily), or interrupted, i. e., perhaps daily for weeks, followed by an interruption of some weeks or months." Just as my friend Dr. Burnett has remarked, it is absolutely impossible to tell in these cases whether treatment is going to be of service, or whether this or that treatment will be the best.

I claim one other thing. It has been said that if a member of the profession were to come here, he would think that we could be of service in this class of cases. I emphatically claim that we can benefit them. We have been doing harm to otology by slurring over these cases of chronic inflammation of the middle ear. No one can tell from one consultation whether he is going to do good or not; therefore I reassert my first proposition, that it is only experience that is going to enable us to tell whether or not we can be of service. The percentage is small in which we cannot be of service, but the treatment must be continued for months or years. Cases of hip-joint disease do not get well in a few weeks or months. If chronic ear catarrh were treated with the same perseverance as cases of hip-joint disease are treated, much relief would be given. No one realizes more than I do the importance of preventing these chronic catarrhs. I have been astounded to hear it asked what should be done in the treatment of acute catarrh in young children. The chief treatment is inflation. This will relieve the pain in very young children in a few minutes. Nothing can be more striking than the results of simple inflation. I cannot conceive myself sitting down before a small child and attempting to perforate the membrana tympani artificially. My experience precludes such an idea. It is not necessary. I would, of course, insist on treatment of such children to

set aside the chronic naso-pharyngeal catarrh, usually at the bottom of the ear trouble. To return to the cases alluded to in the paper — what shall we do with them? Let them go? Shall we put the catheter in the hands of the patient, or put the balloon in his hands? This, it strikes me, is not rational, and I have yet to see the first case in which good has resulted. So far as I can see, it means — slurring them over.

As regards general treatment, I did not allude to hygiene simply because it goes without saying, but this local treatment is of vastly more consequence. How many of any one's patients are capable of carrying out any special plan of hygiene? How many can leave the locality in which they live? It is practically out of the question.

Dr. J. S. Prout, Brooklyn: — In regard to the use of ointments I may say that I have used them in the nasal complications of strumous ophthalmia and have found them of service. Holding the child's head between my knees, a small quantity of the yellow oxide of mercury ointment— made with vaseline — is put into each nostril and the child made to snuff it in. It is thus applied to the nasal mucous membrane, and some of it undoubtedly is swallowed — the latter a result that I always try to obtain. The local and general improvement is often surprisingly marked at the next visit of the patient. I can, therefore, readily believe that, as used by Dr. Seely, good effects are often obtained by their use.

Dr. J. A. Andrews, New York: — I should like to ask if any member has seen middle ear trouble follow the use of the spray, employed for the purpose of washing out the nasal passages? I refer to the spray producer which occludes the nostril and drives the spray in the most favorable directions for a thorough cleansing of the passages.

Dr. Samuel Theobald, Baltimore: — I have seen it in

one instance after the use of Delano's atomizer. I had been using in this case, as I frequently do when there is decided nasal catarrh, a solution of bichloride of mercury, one-fourth of a grain to the ounce. It occurred to me that the addition of tannic acid would be beneficial. In two cases in which I tried it, I had to give it up, for the tympanic membrane flushed up, and pain in the middle ear followed.

Dr. Charles H. Burnett, Philadelphia :—I have never seen any evil result in the ear from the nasal spray. I use the Magic Atomizer No. 2. I never use a stronger solution of any salt than five grains to the ounce. I have never used tannic acid in the spray.

A CASE OF FATAL EAR DISEASE BEGINNING AS A CIRCUMSCRIBED INFLAMMATION IN THE OUTER HALF OF THE EXTERNAL AUDITORY CANAL.

By Charles J. Kipp, M. D., *Newark, N. J.*

Mrs. U., aet. 28, consulted me for the first time in May, 1884. Her history was as follows: About four months ago she gave birth to a living child and made a pretty rapid recovery. Since that time she has had frequent attacks of severe pain in and about the left ear, each lasting a number of days. Various remedies were prescribed for her, none of which has, however, given her permanent relief. She has never had otorrhœa, and her hearing, even during the attacks of pain, has never been much impaired.

On examining her *left ear* I found the walls of the outer half of the external auditory canal considerably swollen and red; the inner half of the canal was of normal dimensions and its integument but little reddened. The drum-membrane was greyish, opaque and sunken; its dermoid layer slightly macerated. The Eustachian tube was easily permeable; inflation through the catheter caused bulging of the drum-membrane, especially of its upper posterior quadrant. No perforation noise was heard and there was no evidence of a free exudation in the tympanic cavity. The integument over the mastoid process was entirely normal, and percussion of the mastoid gave no pain.

The functional examination made after the inflation showed that the watch and the voice were heard very near-

ly as well with this ear as with the healthy ear. Tuning forks placed on the vertex were heard equally well on both sides.

Believing the disease to be a furuncular inflammation of the external auditory canal, I gave a favorable prognosis, and advised the application of leeches in front of the tragus and under the ear, and of pledgets of lint soaked in a warm solution of morphine in the meatus.

A week later I saw the patient again. She reported that the pain had subsided, and on examination I found that the swelling and redness of the external canal had nearly disappeared. The hearing was normal.

During the following week another small boil developed close to the meatus, which, however, did not give her much pain and disappeared rapidly.

At her last visit to me, just a month after the first, she reported that she was entirely free from pain, and the examination showed that the ear was again in its normal condition. I dismissed her as cured and did not see her during the following seven months.

On the 27th of January, 1885, I was requested to visit her at her house as she was unable to leave the bed. I saw her on the same day and learned from her physician, Dr. Bayles, that she had been delivered of a living child four weeks before; that the labor had been uncomplicated, and that she had been in good health till five days ago when she began to have pain in her left ear. The pain had steadily increased, notwithstanding the application of six leeches around the ear and the continuous use of poultices. On inquiry I also learned that in the interval between her last visit to me in June, 1884, and the present attack, she had had neither pain in, nor a discharge from either ear. I found her in bed with her head wrapped up in shawls. She was in a state of high excitement and complained greatly of pain and noise in her left ear. Her face was

very pale and covered with perspiration. The pulse was about 90 and small. She spoke in a much louder tone than formerly, and when her attention was called to this she stated that she was unable to hear her own voice.

On examining the *left ear*, I found the meatus completely closed by a large furuncle seated in the lower posterior wall. At its most prominent point the skin was broken, and on making gentle pressure with a probe on the swelling a drop of thin pus escaped from the opening. The anterior wall of the meatus and the tragus were also much swollen and very sensitive to the touch. There was also redness and œdema of the parts in front of, below and behind the auricle, for a short distance from it. The auricle did not project unusually from the head and no fluctuation could be detected in front or behind the ear. Even the most gentle handling of the auricle was extremely painful, and pressure made in front of the tragus and on the mastoid close to the insertion of the auricle caused the patient to cry out with pain. No attempt was made to introduce a speculum into the meatus. She was able to hear loud speech when the other ear was closed, and could hear the tick of the watch (normal distance 60 inches) a few inches from the ear, and also when placed on the mastoid.

The examination of the *right ear* showed the meatus and the external canal to be entirely healthy; the drum membrane was of greyish color, dull and sunken. Inflation of the middle ear by Politzer's method caused considerable bulging of the drum-membrane, especially of its upper posterior quadrant, and completely and permanently restored the hearing of this ear.

In the absence of symptoms indicative of serious disease of the middle ear, I felt justified in assuring the patient that the present attack was similar to the one from which she had suffered seven months before (furunculosis).

As the boils had already broken, I did not think it necessary to incise the swollen walls of the meatus, and advised the application of a warm solution of morphine by means of compresses to the ear and the internal administration of morphine in sufficient quantity to cause sleep. For the tubal catarrh I recommended daily inflation by Politzer's method.

On the first of February (five days after my first visit) I was asked to see the patient again. Since my previous visit she had had a "bilious attack" which had prevented her attendants from giving much attention to the treatment of the ear trouble. In the opinion of her medical attendant, Dr. Bayles, the vomiting was caused by the morphine. She was suffering less from pain in the left ear, but her general condition was not at all improved. The ear-ache still prevented refreshing sleep. I found that the swelling of the walls of the meatus had subsided considerably and the redness and œdema of the parts adjoining the auricle had almost entirely disappeared. Pressure on the mastoid process was no longer painful. I could now introduce a small speculum into the external meatus without giving the patient much pain. I found the inner half of the canal of normal dimensions, but its integument was covered with macerated epidermis. The drum-membrane was of greyish color, opaque, dull and very concave. Inflation by Politzer's method caused marked bulging, especially in the posterior half of the membrane. The hearing of this ear was not much improved. I recommended the substitution of instillation of a warm solution of morphine for the compresses to the auricle, and the internal administration of quinine in medium doses.

On February 4, I made my next visit, and found no material change in the patient's condition and continued the same treatment.

On February 8, I was asked to see her again. The pain

in the ear had greatly increased the previous night and still continued. The seat of the pain was described as very deep in the ear or in the head beyond the ear. The external canal was now of normal dimensions in its entire length and its integument was still covered here and there with scales of macerated epidermis. The mastoid region was neither red nor swollen and percussion of the same was not painful. Below the auricle was a swollen gland which was tender to the touch. The drum-membrane was in the condition previously described. The Eustachian tube was very permeable, as was shown by Valsalva's experiment. Being unable to account for the return of the pain by the development of new furuncles or an inflammation of the middle ear, I concluded that the pain was due to a diffuse inflammation of the canal, which was just beginning. I thought it best, however, to make sure that the pain was not due to the presence of a free exudation in the tympanic cavity, and therefore made a large incision in the posterior half of the drum-membrane. No fluid escaped from the opening, and on inflation of the middle ear by Politzer's method only air came through the incision. I advised that the instillation of warm morphine solution be discontinued for a day or two, and that quinine and morphine be given internally, and requested to be called in a day or two if the pain continued. I did not see her again till

February 14. On this occasion I saw her in consultation with the attending physician, Dr. Bayles and Dr. Alfred L. Loomis of New York. I learned that she had not complained of pain in the ear since my last visit, but had suffered very greatly from paroxysmal pain in the upper part of the head, and also in the spine. She had had no chill and the temperature had varied but little from the normal (I may here state that the temperature was at no time during the whole course of the disease more than two degrees above the normal). The ear was in the condi-

tion last described. The opening in the drum-membrane had closed again. There was no otorrhœa, and firm pressure on the mastoid caused no pain. Below the auricle there was still a swollen gland. The hearing of this ear was now more impaired than before. A very loud ticking watch was heard only on contact with the auricle or the mastoid. Tuning forks placed on the vertex were heard equally well on both sides. They were also heard when held in front of meatus and when placed on mastoid. With regard to the nature of the disease we came to the conclusion that it was a neurosis of the head. Aside from the intense pain in the head there were no symptoms present which would have justified us in making the diagnosis of meningitis. It was agreed to give morphine in sufficient quantity to subdue the pain.

I did not see the patient again, but learned from Dr. Bayles that she died on the 19th of February—three days after my last visit to her.

Autopsy. The autopsy was made in New Brunswick, Maine, by Dr. Alfred Mitchell, of New Brunswick, and Prof. S. H. Weeks, of Portland, Maine, several days after death. The notes kindly sent by Dr. Mitchell to Dr. Bayles state that "there was evidence of intense inflammation over the entire extent of the arachnoid and pia mater. Upon the left side there was found a thick accumulation of pus at anterior portion of cerebellum, where it rests upon the posterior surface of the petrous portion of the temporal bone. The left auditory and facial nerves were completely embedded in pus. Pus was also found upon the pons varolii. The cerebro-spinal fluid surrounding the medulla oblongata was mingled with pus. A small abscess about the size of a bean was found in the anterior border of the left lobe of the cerebellum, close to its junction with the pons. Lymph was found at the optic commissure and around third nerve. The mastoid cells

were filled with purulent fluid. Nothing was found in the middle ear (tympanic cavity) save a thin exudation. On minor and major sections of tympanic cavity very slight evidences of a preëxisting inflammation were found — in fact none. The ventricles were in normal condition and the choroid plexuses uninjected." Further particulars are wanting.

Remarks. The interest of this case lies in the absence of the usual objective symptoms of abscess of the mastoid process, and in the relationship between this disease and the circumscribed inflammation of the outer half of the external auditory canal.

It is true that redness and œdema of the covering of the mastoid process, close to the insertion of the auricle, and pain on pressure on this part was present when the furuncle was at its height. But these symptoms, as is well known, often enough accompany simple follicular inflammation of the external canal. They disappeared, moreover, with the furuncle, and did not return. The only point about the ear which remained sensitive to pressure after the boil had disappeared, was situated below the auricle where there was an enlarged gland. In the inner half of the external canal neither the upper nor the posterior wall was markedly swollen at any time. The macerated condition of the epithelial covering of the walls, I attributed to the action of warm solutions dropped into the ear. Pains deep in the ear and in the head beyond the ear, were the only symptoms pointing to serious disease of the ear. The pain was never referred to the mastoid region. The patient had no rigors, and fever was noticed only during the development of the furuncle.

Very severe pain deep in the ear which did not yield to milder remedies, occurring in cases of purulent inflammation of the middle ear has always been for me an indication for making an opening in the mastoid cells; in the

future I shall not hesitate to do this operation also in cases of continuous, very severe pain even when otorrhœa is absent.

Whether in this case the mastoiditis was the primary disease and the inflammation in the outer half of the external canal secondary, or *vice versa*, must remain undetermined, as the condition of the cortex of the mastoid process is not mentioned in the notes of the autopsy. It seems, however, not improbable that the mastoiditis resulted from an extension of the inflammation from the external canal to the mastoid cells. For, if the mastoiditis had existed previous to the development of the furuncle it would doubtless have manifested itself by pain in or about the ear before the boil appeared. On the other hand, the very rapid spread of the disease to the intracranial cavity would seem to favor the theory that the mastoiditis preceded the boil. I know of no other instance in which an abscess in the mastoid followed a simple inflammation in the outer half of the external canal.

DISCUSSION.

Dr. O. D. Pomeroy: — Was the temperature above normal at any time?

Dr. Kipp:—No.

Dr. Samuel Theobald:—Do you not think that the inflammation might have extended from the middle ear?

Dr. Kipp:—I have stated that preceding the external swelling, there was no appearance of inflammation of the mastoid. The woman had been perfectly well for nine months after she had the succession of boils. There is no evidence that mastoid disease occurred primarily and the boils appeared secondarily. If there had been primary disease of the mastoid, we should have expected that pain would have existed for some time before the appearance of the swelling in the meatus.

Dr. D. B. St. John Roosa, New York :—It seems to me that the history is not exact or full enough to allow us to come to a positive conclusion ; but long ago attention was called by v. Tröltsch to the occurrence of disease of the mastoid portion of the middle ear from disease of the auditory canal extending directly from that portion of the auditory canal with which the mastoid cells are in connection. It is certainly uncommon to have suppuration of the auditory canal extending to the mastoid with the drum-head intact.

A second point is the indication for opening the mastoid. It certainly has been shown very clearly that persistent pain in the region of the ear not relievable by other means within a reasonable period, is an indication for opening the mastoid. I formulated some rules, some six years ago, in my text-book. Dr. Ely opened such a mastoid four years ago and found pus, and the patient got well. I think that that indication has been a good one for some time. I am far from saying that the indication was clear here ; this was a very blind case, and exceptionally blind for the reason that Dr. Kipp did not have exclusive control of it. If the examinations of the ear could have been conducted by him, we might have had more data than we now possess.

Dr. Charles J. Kipp :—I will supplement my paper with a few remarks. This woman was delivered of a child four weeks before the development of the last attack of ear trouble. We could not tell how much of the excitement and weakness were due to the puerperal condition. There might have been some condition of the breasts producing many of the symptoms. The very short duration of the disease — only twenty-one days — must also be taken into consideration. A week before her death there was no pain about the ear. I could percuss the mastoid without producing pain. The pain that she had, she described as

"beyond the ear." If pain had been caused by pressure, I should have opened the mastoid. Notwithstanding my frequent examinations, I could detect no disease of the mastoid.

Cases of this kind must be extremely rare. There was no lesion of the drum-head, there was no otorrhœa, there were no signs of pre-existing disease of the tympanic cavity.

Dr. Samuel Sexton:—Was there any redness over the mastoid in the early part of the case?

Dr. Charles J. Kipp:—At first there was some swelling and redness over the mastoid and in front of the ear. This disappeared with the swelling of the walls of the meatus. The membrana flaccida and drum-membrane proper were normal and intact.

Dr. Samuel Sexton:—This is just such a case where inflammation extends from the attic of the tympanum, without disturbing the atrium.

Dr. J. Orne Green, Boston:—It seems that this should make us cautious to study the early history of these cases and emphasizes what Dr. Roosa has said about pain in the mastoid unrelievable by other means being an indication for perforation. It certainly is so in some cases.

My first impression was that this was a case of inflammation of the tympanum followed by inflammation in the mastoid, without marked signs, and then the inflammation in the tympanum had gone down, leaving the mastoid trouble. This happens sometimes. From the history this appears not to have been the case. Pain in the mastoid, with a previous history of inflammation in the tympanum, I have regarded as an indication for perforation when the pain was not relieved by other means. This case would seem to indicate that pain in the mastoid with a previous history of inflammation of the canal might be another indication for the operation.

Dr. B. E. Fryer, U. S. A.:—I would ask as to the mental condition. Was there any vomiting?

Dr. Kipp:—There was vomiting, which was attributed to the morphia which was administered. It ceased after the morphia was suspended.

Dr. J. A. Andrews, New York:—I think it is unfortunate that we have no account of the condition of the temporal bone in Dr. Kipp's case. I have been collecting temporal bones for the purpose of studying them in connection with mastoid disease. In a few instances, I have found a congenital defect in the posterior wall of the bony portion of the external auditory canal, through which a connection was established with the mastoid cells, and it is most probable that this condition existed in Dr. Kipp's case.

Dr. Samuel Theobald, Baltimore:—It may be of interest to mention a case, which has been published, in which, following ordinary acute inflammation of the middle ear, there was slight otorrhœa. I treated the case some years ago and applied powdered alum in water. The discharge was checked, and possibly the subsequent developments were connected with this sudden checking of the discharge. Presently there came on indications of cerebral disturbance. There were hallucinations which continued for some days, with pronounced aphasia. The patient could not express what she wished to say. There was no evidence of mastoid disease. I believe that the inflammation extended directly from the tympanum to the meninges of the brain. The case was slow in its progress, but the symptoms finally subsided, under the influence of bin-iodide of mercury and iodide of potassium, and the patient is now as well as ever.

Dr. Samuel Sexton, New York:—The members of this Society have for several years discussed this question of mastoid disease and the operation for it. I use the

term "mastoid disease" in a general sense. I see that there is still a belief on the part of a great many that pain is a sufficient indication for perforation. I think, Sir, that it is remarkable that so many cases occur to other practitioners where the trephine is resorted to, while I have never seen a case where such a procedure was believed to be advisable. In some twenty thousand cases of ear disease, I have yet to see a case where I thought life could be thus saved; indeed, I can count on my fingers the fatal cases—the actual number is seven—that have occurred, and in none of these do I believe the operation would have averted the fatal result. I have, however, in all such cases taken great pains to maintain drainage.

Dr. Charles H. Burnett, Philadelphia:—I saw, in consultation, a case which so closely resembled that of Dr. Kipp that I shall relate it. The family practitioner asked me to see with him a lady who had for several days suffered with ear-ache. I saw the lady and found that she had a furuncle in the ear. The membrana tympani showed no signs of disease. She had a series of furuncles. She complained, in addition, of intense pain about the ear and over the corresponding side of the head. In the course of ten days from the time that I first saw her, she was able to be about the house. Two months before I saw her, she had had pneumonia, and sugar had been discovered in the urine. There was no redness over the mastoid and no tenderness on pressure. As I have said, in ten days she left her bed. During that time I had incised three furuncles. The membrane and the canal were then normal, but she was weak and pallid.

Within twenty-four hours of the time when I last saw her, she exposed herself suddenly and took cold. She went to bed, and had less ear pain, but decidedly more headache. There were no mastoid symptoms. Some pain was referred to the aural region, but the great pain

was beyond the ear in the head. This lasted for several days and she remained in bed. There were no cerebral symptoms beyond the intense headache. She improved in the course of three or four days. There were no more furuncles and no tympanic symptoms. There was still pain about the ear, and intense headache.

Within a week of the time of my last visit, I heard that she had suddenly died. For several hours before death she was unconscious. A physician was called in consultation, who pronounced death to be due to cerebral abscess. There was no post-mortem. The peculiar feature of furuncles in a case of brain abscess reminded me of the case I have narrated.

I would ask Dr. Kipp if, in the case he described, there was sugar in the urine?

Dr. Kipp:—There was.

Dr. Burnett:—It is said that furuncles in the ear are an accompaniment of sugar in the urine.

THE PRESENT CONDITION OF THE PATIENT FROM WHOM TERATOID TUMORS OF BOTH AURICLES WERE REMOVED IN 1883 AND REPORTED TO THIS SOCIETY THE SAME YEAR.

By E. Eugene Holt, M. D., *Portland, Maine.*

For nearly one year after the last operation for removal, there were but slight signs of any recurrence. At the end of the first year the edges of the auricles commencing at the inferior extremity of the anti helix, began to thicken and become rounded, showing conclusive signs that pathological changes had recommenced. Since then the malconditions have advanced quite rapidly, and at present the recurrent growths are nearly a half inch in diameter and about one inch in length. On the right auricle recurrence has taken place along the middle third from the inferior extremity of the anti helix upwards for the distance of an inch. The tumor is well-formed, of elongated oval shape, fibrous consistence, and of purplish shade. On the left auricle the edges of the middle third are much thickened, rounded, and of the same density and color. The growth, however, is not so extensive as upon the right auricle. Since the last operation the recurrence has been much slower than it was after any of the preceding ones. During several months of the first year after the last operation the patient was pregnant, which may have had some influence in delaying the recurrence of the tumors. And it should be added that the patient is now frequently affected with most terrific

headaches. These have troubled her more or less for three years, at least. At first she had them only at long intervals, but now they recur about every two weeks, varying somewhat in frequency. She is unable to locate the point of pain, but refers in a general way to the whole front of the head. If these headaches last for any length of time she vomits more or less and suffers intensely. Having now learned the use of morphine, when she feels the approach of pain she aborts the attack of headache with a fourth of a grain morphine pill, and escapes the violent suffering she formerly experienced.

PRESBYKOUSIS.

By D. B. St. John Roosa, *New York.*

A certain degree of impairment or diminution of hearing power, is, I think, inevitably an accompaniment of old age, or even of life after fifty years. This impairment or loss cannot usually be detected unless certain tests are employed, hence it is usually not noticed in ordinary intercourse. It is produced by a physiological or senile, rather than a pathological, change in the ear, and it is for this reason fairly analogous to presbyopia, and may be termed presbykousis.*

Presbykousis may be readily distinguished from the impairment of hearing resulting from chronic catarrhal or proliferous processes in the tympanum and Eustachian tube. By means of the tuning-fork (C^2) and watch, or acoumeter, we may make certain tests, more or less objective, which will enable us to distinguish this affection from the impairment of hearing arising from the inevitable changes belonging to advancing years. If a "C^2" tuning-fork be held while vibrating in front of the external meatus and then upon the mastoid process, presbykousic patients, if they have no disease of the middle ear, always hear it louder and longer through the air than through the bone. If they do not, a morbid condition of the middle ear, a pathological change, is added to the se-

* From πρέσβυς, an old man, and ἀκούω, I hear. Presbykousis is a more euphonious word than presby*a*kousis, and I hope etymologists will justify me in dropping the vowel.

nile changes. The tick of a watch or of the acoumeter, is heard by presbykousic subjects relatively much worse than the human voice. Besides the evidences from these two tests, presbykousis is marked by the fact, that its subjects are themselves more sensible of the impairment of which they complain, than are those about them. In other words, although there is an actual loss of hearing, it does not appear in the ordinary social and business intercourse of life. The fact that the conduction of sound to the ear through the bones of the head, notably of the mastoid process, is lessened as years go on, has been observed, but no attempt has hitherto been made to give this fact any particular significance in relation to the hearing power, nor has it been noted that the symptom exists in old persons in connection with the symptoms which I have just described.†

It will also be found that persons who are presbykousic, like young persons with good hearing power, hear much better in a quiet place. Indeed, if the circumstances be favorable, if the room be quiet and the distance from the speaker be not too great, then patients not only hear well, but perfectly well. An octogenarian in excellent general health, who consulted me a few mornings since in regard to his sight and hearing, exclaimed, as we sat conversing in an ordinary conversational tone: "Why, I hear you as well as I ever heard anyone in my life." And this gentleman, a lawyer, said that his hearing was not sharp. On inquiry, I found that he could hear the judge when the court-room was quiet; that he also could hear his clients in his consulting-room; that no one spoke to him of not hearing well; that he was chiefly troubled in noisy places, such as a railway train or a large and vivacious dinner-party, or when the voices or other sounds came from a great distance. This inability to hear at long range is not marked,

† Politzer's text-book, Translation, p. 175.

for the presbykousic patients that I have tested, if free from any inflammatory trouble of the middle ear, can hear an ordinary voice addressed to them in a quiet room, when in a listening attitude, at least fifty feet.

How much worse is the condition of a person, young or old, who suffers from a chronic catarrh of the Eustachian tubes and tympana! He hears badly under all the conditions of ordinary human intercourse. It is only in a din that his hearing power becomes acute enough to enable him to follow and join in ordinary conversation, although carried on very near him, no matter how distinct the tones of the speaker, nor how quiet the room. He thus finds himself unable to carry on any ordinary business, or hear a lecture, a play, or a sermon. His usefulness in any such profession as law or medicine is greatly impaired, if not destroyed. The presbykousic patient, on the other hand, may be greatly annoyed by the subjective loss of which he is so conscious, and which he usually and correctly attributes to senile decay; but he may so arrange matters that although he may never be able to correct his presbykousis as perfectly as convex glasses will relieve his presbyopia, he may go on with the ordinary work of life.

The anatomical conditions which form the basis of presbykousis, in the absence of *post-mortem* examinations of a large number of ears of old persons, cannot, as yet, be positively determined. The evidence of the tuning-fork points toward a lessening of the perceptive power of the acoustic nerve. Indeed, the symptoms are characteristic of those generally considered as evidence of a lesion of the nerve. It is possible that there are more factors than one involved in the causation of presbykousis, as there are in presbyopia. Besides the changes in the nerve, there may be, as here suggested by Orne Green, a senile dryness and rigidity in all the tympanic structures, a want of succulence, which prevents a normal vibration of the

drum-head, and a proper conduction of sound to the senile nerve.‡

It is not probable that presbykousis is caused by abnormal pressure through the base of the stapes bone upon the vestibule and semicircular canals, for vertigo does not attend it.

DISCUSSION.

Dr. Samuel Sexton, New York:—I have listened with much interest to the paper of Dr. Roosa. He attributes to defect of the auditory nerve what some of us attribute to the transmitting mechanism. As regards that matter, I have not changed my opinion, and I see that he has not changed his.

There is a practical point, suggested by the topic under discussion, bearing on the papers read this morning, that is, that those cases of chronic catarrh in persons 45 or 50 years of age, where the disease is stationary, do not always call for treatment. If these cases of aural catarrh continue to progress, as they mostly do from reflex causes, as from nasal catarrh, dental trouble, catarrh of the gums, and civic worry, etc., it seems to me that where any of these causative conditions remain they still call for treatment, but I think that we need hardly treat them for several months, before we find out what good can be accomplished. I hope that with that view of the case less misunderstanding may exist than appeared to this morning.

Dr. Samuel Theobald, Baltimore:—There is one point in Dr. Roosa's paper to which I would take exception, that is in regard to hearing indistinctly where con-

‡The term presbykousis cannot be fairly criticised because the conditions causing it are not complelely analogous to the changes in the crystalline lens and the ciliary muscle, for presbykousis means simply the hearing of an old person, having nothing to do with its causes, as does presbyopia, the *sight* of an old person.

versation is going on, being a symptom peculiar to presbykoustic individuals. According to my experience, this is one of the first symptoms of deafness from any cause, especially from middle ear trouble. I do not think that it is at all peculiar to the condition which Dr. Roosa describes.

I would ask Dr. Roosa whether he intended to convey the idea that anchylosis of the stapes is one of the conditions giving rise to imperfect bone conduction?

Dr. D. B. St. John Roosa:—I simply asserted that in certain cases it would be possible for anchylosis of the stapes to produce pressure on the labyrinth and diminish bone conduction, and that the condition might possibly be relieved by operation. For myself, I think that it does not, but I yield that point to my friend Dr. Blake. He asserts, as I understand him, that in a few cases the same effect is produced by anchylosis of the stapes as by lesion of the labyrinth. If we loosened the stapes, the pressure would be relieved and the bone conduction would be restored.

Dr. Herman Knapp, New York:—I have listened with much interest to Dr. Roosa's paper on presbyakousis. Presbyakousis is certainly a new and, perhaps, a hazardous word. If it is compared with presbyopia, it means contraction of the range of accommodation. There is scarcely anything in the ear that can be compared with the accommodation in the eye. In the sense Dr. Roosa introduces it, it means the deterioration of the function of the ear owing to senile involution which occurs in every organ. It can, therefore, not be called pathological. Senile changes are not unknown. The power of perceiving musical tones is preserved longest, less the perception of the voice, and least that of noises. That bone-conduction is absent in many persons after middle-life, has long been known. I am confident that it will yield excellent

results, if these changes, to which Dr. Roosa has so felicitously called attention, and which he united in one comprehensible word, are investigated systematically and on a large scale.

Dr. J. Orne Green, Boston:—I am much interested in this paper, especially as I have had the subject in mind for some time. For a number of years I have been satisfied that there were changes in the ear something like those in the eye, at least that they were due to advanced years, and I have given that diagnosis and made my prognosis upon it in many cases. I have also no doubt that the diminution of the hearing for the watch is much greater than for the voice. I have taught to my students that the acuteness of hearing for the watch varied with the age. In persons 60 or 70 years of age, I often find that they can hear my watch, which should be heard at seventy-two inches, at only three or four inches or even only one inch, and yet the voice can be heard very well under ordinary circumstances.

I agree with Dr. Knapp, that the condition is not pathological. It seems to me that it may be due to the loss of succulency in all the tissues of the body, and possibly also somewhat connected with the disappearance of the subcutaneous connective and fatty tissue, which leaves the membrane more dry and consequently a little more rigid. I think the cause is largely one of rigidity due to advancing years, and I do not refer it so much to the labyrinth as I understand he does. In the true cases, I do not regard the condition as pathological. It is often difficult to distinguish this trouble from the increase of deafness from hypertrophy of the mucous membrane from previous trouble, which is apt to increase at this time—in other words, from the results of previous catarrhal inflammation in the membrane. In these old catarrhal troubles I refer the increased deafness to loss of succulency. This is, however, mere theory. It has not been proven.

In regard to the tuning-fork, Dr. Roosa comes out much stronger on that point than I supposed he was ready to do. I have been in the habit of making that test, and have often found it of a good deal of value, at the same time I have always recognized that there might be cases of error. In a case of deafness, f. i., where there is nothing in the history, and on examination you find a ceruminous plug in one ear, you apply the tuning-fork and the sound goes in the good ear. I then should feel very doubtful about the result of removing the cerumen. I have seen such cases. Also take a case of purulent inflammation, as in scarlatina, affecting one ear. As the inflammation in the tympanum goes on the interference with the conducting mechanism will give increased sound on that side when the tuning fork is applied to the median line. As the inflammation becomes more intense, and the labyrinth is involved, if the sound of the tuning-fork diminishes on that side, it is probable that the labyrinth is affected. If there is total loss of sound, *which continues after all sources of pressure are removed*, we can almost certainly diagnosticate destruction of the labyrinth.

I have always kept the records of these cases, intending to work them up.

There is one other explanation about diminished bone conduction which has not been mentioned, and that is the diminished bone conduction from the forehead depending on increased density of the bone.

Dr. E. E. Holt, Portland, Me.: —Two years ago I read a paper in regard to some experiments that I had made, and I have not seen any cases to change my opinion as then expressed. I examined 125 persons who claimed that they could hear better in a noise, but I was unable to convince myself that the hearing power was increased by a noise. I assumed that noises gave a medium through which they heard better. In a noisy place the

voice is raised, and its impressions are transmitted to the sensorium with less disturbance in certain partially deaf persons than in the normal condition. I first commenced experimenting with myself. I found that in the moving cars I could hear conversation better than others, but when I tested myself I found that I did not hear a given sound as well there as in a quiet place.

In regard to the diagnosis from bone conduction: if I understand Dr. Roosa right, when there is loss of hearing, the bone conduction being less than the aerial conduction, he attributes the pathology to the labyrinth.

Dr. Roosa:—There. primarily.

Dr. Holt:—I have used the tuning-fork in nearly every case, and I must say that I have not been able to confirm that view. I have experimented in young persons, and found the ratio between aerial and bone conduction to be about one to four. In disease of the tympanum of all grades up to a certain point, we find a diminished ratio. If, in a person partially deaf, we find, as we frequently do, the aerial conduction a little longer than bone conduction, the latter being about normal, are we to infer that we have disease of the labyrinth to deal with? And in the same case, as the deafness progresses, we find at some subsequent test that the bone conduction is greater than the aerial conduction, are we to infer that the disease has changed to the middle ear? Certainly, according to Dr. Roosa's view, the diagnosis would have to be changed in these cases as the hardness of hearing increased, especially if the same case was examined by two surgeons at these different periods. It must necessarily be misleading, since so far as the clinical features of the case are concerned, there would be no change except a gradual increase in the deafness.

Dr. E. E. Williams, Cincinnati:—There is a general idea that all the faculties gradually fail until they wear

out. These common popular notions are usually founded on observation and have some basis in truth.

What I want to say about the tuning-fork is this: I generally find when I strike the tuning-fork and place it on the head of the patient, that if he hears it as long as I feel the vibration in my fingers, it is a good test that he hears it as well as anybody else. I consider then that his bone conduction is as good as natural. I merely mention that as a sort of a guide.

There is another thing: in regard to the influence of noise in producing so-called improvement. I have never believed that. I think that persons who hear imperfectly are less annoyed by noises than those who hear better, and that may be the explanation of it. I have never been able to comprehend why a person should really hear better when there is a noise than when there is silence. I do not believe that it is true.

Dr. H. Knapp:—The comparison between feeling and hearing a tuning-fork is Lenox Brown's test.

Dr. Samuel Sexton, New York:—Since this matter, after all, seems to have drifted around into the field of chronic catarrh of the middle ear, there are certain conditions of the transmitting mechanism connected with the defective transmission of sound which should not be overlooked; for instance, the collapse of the cartilage comprising the auricle and external auditory canal; relaxation of the fascia about the ear and the loss of tone of the exterior aural muscles. In consequence of these defects of age the integument lining the external auditory canal is rendered unduly lax, and the membrana tympani in consequence is deprived of normal tension. Under these conditions high pitched sounds are not transmitted so well as sounds of greater amplitude. These are well established facts, and why defectiveness due so largely to such causes should be relegated to the nerve of hearing, I cannot understand.

Whilst in advanced life there is this loss of tension, I dare say that nerve transmission is also impaired. I cannot see, however, but that the phenomena under discussion are due to a gradual increase of aural catarrh and the general relaxation of the exterior ear, whereby the transmitting mechanism suffers impairment.

Dr. D. B. St. John Roosa :—I should like to answer in detail what has been said. I will begin with Dr. Sexton. For example, the Doctor quotes me in talking of presbykousis as saying that it is an affection of the nerve. I have not said that. The senile changes to which he alludes may be a part of the conditions which produce presbykousis. I do not deny that at all, but I am inclined to think that there is lesion of the nerve in presbykousis. I cannot understand why this argument is persisted in; that while the optic nerve and retina suffer so frequently, the acoustic nerve suffers so seldom that it remains unharmed in probably 98 out of 100 cases.

In regard to pathology, I said that I did not consider it a pathological condition, except in so far as presbyopia was a pathological condition. In one sense this is common to all men, and therefore entitled to be called presbykousis. There is sufficient to justify the term, which simply means the hearing of old people.

I feel much gratified by the attention which Dr. Green has given the subject and the expression of his belief that there is a condition of things in old age entitled to a special name. In regard to the use of the tuning-fork placed upon the vertex, I do consider it a valuable test, but not a test that tests of the bone and aerial conduction do not displace. Take the case of Dr. Green, if we removed the wax from the ear we should know where we were. In his case of scarlatina, he has touched a point where it is of real value. Hearing, tested by bone and aerial conduction is so much better that it is not worth while to trouble

ourselves with the other, although it would confirm our other tests, while I admit the truth of what Dr. Green says of its value.

This brings me to Dr. Holt's criticism. Even if Dr. Holt and Dr. Williams never saw a person that heard better in a noise, if Dr. Roosa has seen one person who has heard better, he has proved his case. I have seen a great many such cases. The facts cannot be refuted. In one case that I have reported a lady could not hear conversation addressed to her at a distance of a few feet; she could not hear the watch. She could hear the tuning-fork through the mastoid bone, but not through the air. She presented all the symptoms of progressive catarrh of the middle ear. By my advice she was taken to the iron works at Scranton, and there she could hear her husband speaking in an ordinary voice some distance from her, while he could not hear except when shouted at. I can multiply these facts by the dozen. These cases are due to disease of the tympanum and not to disease of the nerve. I would be glad if the members would do me the honor to read my papers on this subject.

Dr. Theobald brings an important argument on this subject. It is quite true that persons with middle ear disease have difficulty in hearing conversation when several are talking, but put such patients in a boiler shop or a railway carriage and they will hear worse. There is a certain condition of hearing words in noises that is common to presbykoustics, and to those who have catarrh of the middle ear, but if you intensify the noises up to a certain point the person with middle ear disease always hears better in it. In my allusion to the vivacious dinner party, the difficulty does not appear to be the same as that with a person having good hearing. The presbykoustic must have his hearing within a certain range and must have his faculties directed to the subject in order to hear well. That is an-

other indication that the trouble is situated in the acoustic nerve, and probably in the cerebrum itself. The presbykoustic must have a quiet place and the person must be talking to him. The person with middle ear trouble of slight degree does not always hear in such cases, as he would hear in the clatter of tables and voices and so on. If the Doctor will take a person with pronounced middle ear trouble and examine him in a room that is perfectly quiet, and then have all the noises possible made in that room, he will find, or else this is untrue, that the person will hear a longer distance. If there is nerve trouble they are made worse by it.

I think that I have covered most of the points made by the gentlemen who have criticized the paper. I would simply say, in conclusion, that it is perfectly possible, as Dr. Knapp suggested, that a presbykoustic has catarrh of the tympanum which needs treatment, but where you have these clearly cut symptoms of a fair ear, normal drum-head, a disproportion of hearing the watch and conversation, hearing better in quiet places and hearing perfectly well within a certain range, we must dismiss catarrh. Everything in the ear cannot be attributed to catarrh.

I would simply say in concluding, thanking you all for this patient hearing, that the C tuning-fork, I believe, will give us the best means of determining the seat of the lesion; that there is a condition of things in advanced life, due, perhaps, to conditions seated in the canal, the tympanum, the nerve—a condition of things which produces this impairment of hearing, and always manifested by diminished bone conduction.

In asserting these points, I present them as opinions. If they are overturned I shall be the first to abandon them, but my facts I am not willing to yield.

A CASE OF ACUTE OTITIS MEDIA SUPPURATIVA, FOLLOWED BY MASTOID DISEASE AND PYÆMIA. MASTOID OPERATION; RECOVERY.*

By Gorham Bacon, M. D., *of New York.*

John B. aged 23, a clerk and native of the United States, came to the New York Eye and Ear Infirmary April 14, 1885. The patient, fairly nourished but anæmic, said that he had pneumonia on the left side, two years ago; never had any aural disease before. His father died very suddenly of phthisis, after a short illness. The present attack commenced six days ago, with ear-ache in the left ear, followed in three days with discharge, which has been very free for the past two days.

Examination. Left auditory canal filled with muco-pus and congested: lumen of canal diminished and epidermal lining sodden and peeling off. Membrana tympani very hyperæmic, but not well seen. Right membrana tympani dull and retracted. Acoumeter—Left ear $\frac{1}{4}''$. Right ear, H. D. only fairly good, heard several feet. Tuning-fork on forehead when vibrating, heard better in the left ear. The ear was syringed out with a solution (warm) of bichloride of mercury (1-1000) and iodoform insufflated.

April 17th. Very little pain since and discharge somewhat less. Same treatment continued and a tonic given.

April 27th. Pain better at times, but always bad at night; would not seem to yield to treatment and as there was some

* Read by title at the meeting.

tenderness and redness over the mastoid process, an incision was made $1\frac{1}{2}$ in. long and a flaxseed poultice applied.

April 28th. Pain a little easier last night and discharge somewhat less. Acoumeter L. E. $\frac{1}{2}''$. Poultice continued and to take Pil. Calc. Sulphide aa gr. $\frac{1}{10}$, one every three hours. This remedy has been given for the past few days.

May 3d. Patient came to my office to-day, looking very badly. He said that on the 28th or 29th of last month, he had an attack of nausea and vertigo and slight chilly sensations, but had had none since. Operation advised.

May 4th. Patient admitted at Infirmary as an in-patient. *Operation.* Ether given: an incision was made over the mastoid, down to the bone, which was found rough and softened: periosteum separated from the bone and a small sinus found, leading to the mastoid cells. The mastoid process was opened with Buck's drills and quite a cavity found, containing two drachms of pus. This was liberated, together with some broken down tissue, and bone removed by scraping the cavity. The cavity was washed out with bichloride of mercury solution 1-1000 and iodoform insufflated. The wound was kept open by inserting a plug of iodoform gauze and antiseptic dressing applied.

8 P. M., T. 101°, R. 30, P. 80.

May 5th. The temperature varied to-day from 101°–102.4°. He was given whiskey several times daily and a diet of milk and beef tea.

May 7th. Temperature rose to-day to 104.6°. Antipyrine given. Tongue dry, countenance anxious and depressed, eyes sunken, patient restless and irritable. Some delirium at night.

May 8th. Temperature fell under the influence of antipyrine, to 96°. In the afternoon a chill, followed by sweating. Temperature rose again to 101°.

May 9th. Quinine substituted for antipyrine.

May 17th. Temperature since last date which has

varied from 99° to 100° in the morning, and from 101°–102.5° in the afternoon, rose this afternoon to 104.4°.

May 19. The discharge, which has never been profuse from the mastoid, has been growing less: same treatment continued. Some congestion in the upper part of the left bony canal and extending down along the handle of the malleus; no perforation seen.

May 19th. For some days past he has had paroxysms of coughing, with scanty muco-purulent expectoration. Examination of the chest gave evidences only of bronchial catarrh. Resonance to percussion and vocal fremitus fairly good all over the chest. Respiration catching and interrupted over the left side at the middle of the chest posteriorly and at the apices of both lungs posteriorly, the expiration is somewhat high-pitched and prolonged. The vocal resonance considerably intensified over a limited area in the middle of the chest posteriorly on the left side. Occasionally fine bronchial râles are heard. Breathing is not painful and the respirations not greatly increased.

The sputum, as well as the discharge from the mastoid, was examined for tubercle bacilli by Dr. J. L. Minor, but with negative results.

For some days there has been considerable pain on motion and tenderness to pressure at the left shoulder, the tenderness being especially pronounced on the anterior aspect of the joint over the course of the pectoralis major muscle. There is a general fulness and induration of the parts about the joint, although the latter does not seem to be involved. There is, however, no sharply circumscribed swelling. To-day, the patient seems better in every way. He eats better and sleeps, although requiring morphine every night. He is very much emaciated; face sunken, skin moist.

Acoumeter, R. E. 18″, L. E. $\frac{1}{4}$″.

Tuning-fork heard better by bony conduction than aerial

in the left ear. The patient has complained for some time of general pains all over the body and it is necessary to raise him very gently in bed: his appetite is very poor.

May 22d. The temperature has been rather lower, not rising over 102°. Pulmonary signs about the same. A number of râles, which are removed by coughing, are audible on deep inspiration. Inspiration still catching: almost cog-wheel in type on the left side, although not associated with pain. No positive evidences of consolidation, excavation or pleuritic effusion. The shoulder still painful and swollen.

A collection of pus or "cold abscess," unattended by pain or inflammation, was discovered to-day in the right lower peroneal region, very close to the ankle joint. This was opened, fairly healthy pus evacuated and a superficial abscess cavity disclosed running upwards and backwards for two inches. Dressed with bichloride of mercury solution and iodoform and a drainage tube inserted.

May 24. Two distinct chills this morning. In the afternoon the temperature rose to 104°.

May 25. No chills to-day, but the patient sweats a great deal, especially at night. Three more superficial abscesses opened to-day on the right and left thigh and the left leg. The pus was dark colored and fetid. Dressed in the same way. Temperature to-day only rose to 101.2°.

May 26. The swelling over the shoulder still painful, Hot applications made to the shoulder. Besides the quinine he was given $\frac{1}{10}$ gr. of calcium sulphide four times daily. Temperature this afternoon 104°.

May 27. Two more abscesses like the others opened to-day, one on the anterior and lower aspect of the right thigh, just above the patella and containing offensive pus, and the other on the right upper arm, somewhat above the elbow. Both small and comparatively superficial. Temperature this afternoon 103.6°.

May 28. During the past 24 hours, there has been considerable diffuse bogginess and tenderness about the left side of the neck. To-day, the presence of pus being evident, an incision was made deeply into the tissues of the neck, at a point three inches from the interclavicular notch on a line joining the latter with the mastoid process. About three ounces of fairly healthy, thick pus were evacuated by expression and the abscess cavity was found to extend upward and backward nearly to the angle of the jaw in front and almost to the tip of the mastoid region behind. It appeared, however, to have no direct connection with the abscess cavity in the mastoid. Same dressing used as before. Temperature to-day reaching only 101.8°.

May 29. Patient looks better to-day. Abscess cavities healing and the drainage tubes were removed from those in the legs. Shoulder is better; the swelling softer and less marked. A hypodermic needle inserted several times has never shown any pus. He still coughs some and the pulmonary signs show no marked change.

June 1st. To-day a well marked chill occurred, which seemed to be due to a retention of pus in the cervical abscess cavity. Dr. Robert F. Weir kindly saw the patient to-day and advised opening freely the abscess cavity, which was done and three ounces of pus evacuated and a drainage tube inserted. The sulphide of calcium was discontinued and at the suggestion of Dr. Weir, the patient was given Hydrarg. bichloride gr. $\frac{1}{30}$ three times a day, together with small doses of sulphate of iron, and the quinine was reduced to grs. X a day.

June 5. Patient improving rapidly now. Skin looks better. Has no chills and sweats but little. Temperature has been lower. The arm is better, but the phlebitis and periphlebitis are gradually extending down the forearm and the whole arm is very large and œdematous. Warm applications continued. The tube was removed to-day from the abscess cavity in the neck.

June 7. The patient walks out daily. The bichloride of mercury and iron were discontinued to-day and a tonic substituted.

June 9. All the abscess cavities are healing rapidly, as well as the opening in the mastoid which discharges but little. Upper arm much less swollen, but the induration and œdema in the forearm more apparent. Warm applications continued and a wash of lead and opium used.

Pulmonary signs show but little change except that the evidences of bronchitis have disappeared.

Temperature still shows a slight rise every afternoon.

June 23. Patient has been walking out every day and gaining strength. All the abscess cavities have healed, as well as the mastoid opening. The phlebitis in the arm has disappeared.

The hearing distance has improved very much and the tuning fork when vibrating and placed on the forehead, still heard better in the left ear.

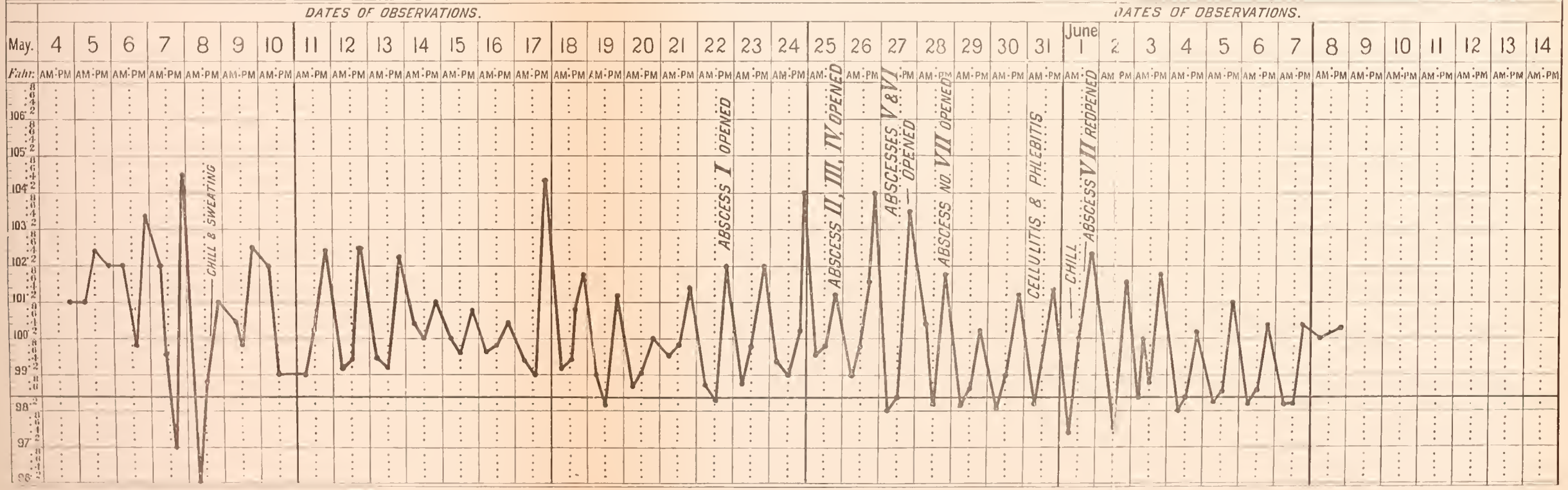
The patient was today discharged from the Hospital.

July 7th. He reported to-day, and said he was feeling well and was going away to the mountains.

Remarks. The patient came to the Infirmary April 14 and attended regularly for two weeks. Though somewhat better at times, the pain persisted and was referred principally to the auditory canal, and he did not have any well-marked symptoms of mastoid disease. From April 28 to May 3, he disappeared from observation. On the latter date he came to my office, hardly able to walk, and said he had had an attack of nausea, giddiness and chilly sensations, and the family physician, who was attending his sister at the time, thinking that he was suffering from indigestion, prescribed accordingly. When admitted to the Infirmary he presented a very anxious appearance and he was evidently suffering from blood poisoning at the time. Perforation of the bone showed that the disease had existed there

NAME. JOHN B—

DISEASE. MASTOID SUPPURATION, PYÆMIA, MULTIPLE ABSCESSES, PHLEBITIS & PERIPHLEBITIS OF ARM.



for some time, possibly from the beginning of the attack. The wound was treated antiseptically as well as all the abscesses, with bichloride of mercury solution and iodoform. He was given principally quinine in moderate doses, never exceeding 20 grs. a day, except on May 25th, when he received 30 grs. He had whiskey several times a day besides milk and beef-tea.

At the suggestion of Dr. Weir, who saw him June 1st, and who had used this remedy with marked benefit in similar cases, he was given Hydrarg. bichloride gr. $\frac{1}{30}$ three times daily, combined with small doses of sulphate of iron. Quinine in smaller doses was continued at the same time. The patient had, however, passed the critical stage before this change of treatment.

Cases similar to this one, which are characterized by severe pain, which persists even after rupture of the drumhead and when the discharge, though containing some pus, is decidedly blennorrhœal in character, have in my experience always proved obstinate ones to treat. The inflammation, I believe, is periosteal from the beginning, and in such cases there is always danger of mastoid disease and other complications.

VERBAL COMMUNICATIONS.

FISTULA AURIS.

By Dr. E. Dyer, *Newport, R. I.*

Dr. Ezra Dyer, Newport, R. I. :—I wish to report a case of Fistula Auris, as it is not common, and the treatment I followed is new.

The subject was a girl of 14. A fistulous opening had existed in the tragus of the right ear since birth. It discharged frequently matter which was offensive, and a probe could be passed a cm. to the bottom of the sac. A slight depression was seen at a corresponding point on the other ear. Various attempts had been made to stop the discharge before I saw her. I determined to destroy the sac with the actual cautery, which I easily accomplished by passing a platinum wire the length of the sac and bringing it out in front at the bottom. The short loop was then attached to the battery and the current applied. The pain was not very severe, and but slight reaction followed. Only the mouth now remains, and the discharge is confined to an occasional drop of serum. The probe now enters 2 mm.

Dr. H. Knapp :—These branchial fistulæ are not so rare as is usually supposed. They may keep quiet for a number of years and then discharge, but most of them discharge occasionally.

Dr. Charles J. Kipp :—I have described a number of these cases of fistula. They run in families. Many of them are the seat of suppuration once in a while.

Dr. Samuel Sexton:—There is more or less deafness associated with these defects in all the cases I have seen. I have also found in the drum-head evidences of other defects. A considerable number of cases of deaf mutes have arrested closure of the first branchial cleft.

Dr. H. Knapp:—This is not borne out by my experience. It is well known that the formerly so-called fistula auris congenita has nothing to do with the development of the ear.

Dr. Charles J. Kipp:—I have searched for these cases. They do not come for impairment of hearing.

Dr. Samuel Sexton:—Those morphologists that I have consulted—Balfour and others—consider that the closure of this branchial cleft is intimately connected with the development of the tympanum, Eustachian tube and external auditory canal. These fistulæ, therefore, give evidence of defective development of parts essential to good hearing.

BINAURAL CONVERSATION TUBE FOR THE AURAL INSTRUCTION OF THE DEAF.

By Samuel Sexton, M. D., *New York.*

Dr. Sexton stated that in many instances the deaf seemed to get the best idea of the character of sound constituting the human voice when spoken to through a mouth trumpet as recommended by him many years ago, but there were a large number of deaf children who could obtain a pretty good idea of the natural sound of the voice by means of a binaural tube, whereby they may compare their own voice with the teacher's. The advantages of the binaural transmission of sound are manifest where some

hearing power remains in both ears. The instrument is serviceable in teaching almost all very deaf children or in

conversing with deaf people. The sound of the voice is not so much increased by this instrument as not to be heard in a natural tone as when spoken directly into the ear by close contact of the speaker. The painfulness of trumpets and conical tubes is thus avoided. The application and use of the instrument are well shown in the accompanying illustration. They are manufactured by Mr. W. F. Ford, of Messrs. Caswell, Hazard & Co., New York. [Since the instrument was shown to the Society Dr. Sexton has caused a self-retaining appliance to be attached so that a spring holds the ear pieces in place.]

The President :—I understand that Professor Graham Bell has a communication to make. We should be pleased to hear him at this time.

REMARKS OF PROF. A. GRAHAM BELL ON THE POSSIBILITY OF EDUCATING THE HEARING OF DEAF MUTES.

Mr. President and Gentlemen: I am glad to see an aurist like Dr. Sexton taking up this subject of apparatus for those who are semi-deaf. I have myself been experimenting with apparatus on a similar plan in little children, but I have avoided putting anything into the external canal under the impression that it might be injurious. My apparatus consists of coverings or caps for the two ears. The tubes from these join in a common tube and to that is attached the speaking apparatus. I am glad to have the Doctor direct attention to the importance of devising means of utilizing the hearing of the semi-deaf. We had no idea until within a year or two how large a proportion of the so-called deaf mutes in our institutions were only hard of hearing; the number is especially large among the congenitally deaf. A child is born with partial hearing, but not sufficient to enable him to acquire speech by imitation. It is now found that with artificial aids to hearing, such children can be taught to speak, and when so taught, they are only hard of hearing. In 1871, I made experiments in the Boston School for Deaf Mutes, but it is only within the last two years that attempts have been made in this direction. The results have been startling in the Nebraska Institution for Deaf Mutes. To-day, no less than fifteen per cent. of the pupils are graduated as hard of hearing speaking people and not as deaf mutes. Mr. Gillespie, the principal, thinks that as many as twenty-five per cent. have sufficient hearing power to be made of use.

The utilization of this power of hearing has been considered by two conventions during the past two years. One in New York, the convention of teachers especially devoted to articulation teaching, the other, the convention of Superintendents and Principals of our Institutions for

the Deaf and Dumb. At both conventions it was seen to be of great importance to ascertain what proportion of pupils in our institutions have sufficient power of hearing to be made of use. It is difficult to ascertain this, especially in little children. It has been customary for a long time to summon deaf mutes by ringing a bell. It is difficult to determine how far the hearing can be made of use. The proportion is as large as fifteen per cent., and experiments indicate that it may be still larger. A large proportion of the pupils learn to use the hearing power they possess, so as to be only hard of hearing persons. What process goes on we cannot tell, but the fact is this: you take a child who cannot speak, and test the hearing with a hearing tube. You perhaps find that he imitates vowel sounds. You take him and teach him through the eye, through the ear and through the motions of the organs in speaking. The child learns to speak, and as he speaks he learns to hear, so that after a few months' instruction, the child may be put in front of you with his back towards you, and then, speaking to him in a raised tone of voice, he hears. I have not had the opportunity of examining the pupils in the Nebraska Institution, but an examination of other cases shows me that there is something here that otologists should examine.

There is a young man named Jones in the New York Institution. He passed through the whole curriculum as a deaf mute, and graduated at the National College for Deaf Mutes. He then became a teacher in the Institution in New York. He married a hearing lady whose attention had been attracted by these experiments in Nebraska, and as she knew that her husband had considerable hearing power, she tried to teach him to speak. This was one year ago. He now speaks very well, and what is more curious, he hears very well. I saw him in New York. I placed him at one end of a long room and gradually left him, and finally went out of the room, where he could not

see me, and carried on a conversation with this man who had been educated as a deaf mute. What has occurred there? Whether or not his hearing had been changed as some teach, for there seems to be an idea that there is a change at puberty in the semi-deaf, especially the congenital deaf. I, however, have no statistics to show whether or not this change takes place. I examined 117 cases in the New York Institution, and compared the hearing power with the records of admission, and in many cases, where the deafness had been certified as total by aurists, the pupils were found to be able to imitate speech from hearing. They could imitate vowel sounds very well. There is here a wide field for investigation.

There is another subject in close connection with this which would interest the otologists of this country. The Superintendents and Principals of American Institutions for the Deaf and Dumb at their last congress attempted to remedy a great defect. There are no statistics of any importance regarding the deaf and dumb. A committee has been appointed to consider the collection of statistics regarding the deaf and dumb, so as to propose a uniform form for the collection of statistics, and it is probable that a central bureau will be established at Washington. I was placed upon that committee. When we considered the subject we were met with one difficulty, and that is the classification of the causes of deafness. This is a subject which should interest otologists. We have no rational classification of the causes of deafness. In our institutions we are, as a rule, obliged to take the causes assigned by the parents. I suggested that this matter be brought before the Otological Society, and I was authorized by the committee to call your attention to the matter. What we should like would be this: We should like—the Superintendents and Principals of this country would like, to present to your society, or some committee of your society, a

list of the assigned causes of deafness from some of our large institutions and have you suggest a rational classification. If any committee of this society would take the matter under consideration, their recommendations would be adopted all through this country. If I were to give you a list of the assigned causes, alphabetically arranged, (some of the causes are ridiculous), you could place the probable cause opposite it, so that the Superintendent who has no knowledge of the ear, when he has a cause assigned, can consult the list and place the cause of deafness under the category you should direct. If we could get some rational classification of causes that could be collected in statistical form, you would have — probably within twelve months—statistics relating to the cause of deafness in seven thousand deaf mutes.

There is another important point about which teachers are entirely at sea, that is, in regard to the congenital deaf. It makes no difference to a teacher, from an educational point of view, whether a pupil is congenitally deaf or whether he lost his hearing early in life. That does not affect the problem. Deaf mutes, however, marry one another, and it would be a matter of importance if any means could be discovered to indicate those who may have a hereditary tendency. The only means that we have at present is the fact that deafness has affected more than one member of the family. More than fifty-four per cent. of those reported as congenitally deaf have other members of the family deaf. In such cases there is, probably, some hereditary taint. As deaf mutes marry one another, it would be important if any indication could be given of those who might hand down their affliction. Of course those who have become accidentally deaf are more apt to transmit deafness than one who has lost an arm or a limb is liable to transmit his deformity.

I think that aurists should take an interest in our deaf

mutes. I think that all the pupils in our institutions should be examined by competent aurists, simply for the information, if nothing more, to determine if anything can be done to benefit the hearing. It is certainly the case that in the institutions, there is a large percentage, I believe over twenty-five per cent., who have sufficient hearing power to understand speech through an ordinary speaking tube. If any means can be suggested by which the remnant of hearing power can be increased and we can artificially bring these patients to hear, it will be a great benefit.

I consider this plan of bringing the voice of the child to his ear so that he may contrast it with the voice of his teacher and the voices of other pupils to be a great advantage. His teacher's voice is his model and such a tube will tell him how near he approaches that model in his utterances.

Dr. O. D. Pomeroy:—I would like to ask a question. I have heard that the children of deaf mutes are oftener deaf mutes than the children of others. Can Prof. Bell give us any information on that point?

Professor Graham Bell:—There is a larger proportion, but exactly what the proportion is we have no means of telling. I have some imperfect statistics which show the proportion to be at least ten times that of individuals at large. The proportion of deaf mutes to the population is one to fifteen hundred. There are 33,878 deaf mutes. If deaf mutes were no more liable to have deaf offspring, we should have no more than twenty-three deaf mutes, who are the children of deaf mutes. I have a list of 207 deaf mutes, the children of deaf mutes. This gives us nearly ten times the normal proportion. These were returned from thirty-five of our fifty-eight institutions and do not comprehend children under ten years of age. It is certain that the proportion is ten times greater and it is probably twenty times greater than normal.

The researches of Turner show some remarkable results. They show the proportion somewhat in this way. Where a congenital deaf mute marries a congenital deaf mute there would be about seventy out of a hundred; these statistics, however, only include about eighty families. From my own researches, I may say that the proportion is probably enormous among those who are likely to transmit the defect. A large proportion, I think, will not transmit the defect. In families containing more than one deaf mute, it is found that the hearing members are liable to have deaf offspring by inter-marriage. In the report of the Milwaukee Asylum for Deaf Mutes for 1877 the proportion of deaf offspring was larger among those deaf mutes who married hearing persons, than it was among those who married deaf mutes. I find that the hearing persons belonged to families containing deaf mutes, whereas those who married deaf mutes were cases of adventitious deaf mutes, so that hearing persons belonging to deaf mute families are more liable to have deaf offspring than deaf mutes from accidental causes.

Dr. D. B. St. John Roosa, New York:—As regards the causation of deafness, in deaf mutes, I notice a very remarkable change in the appearance of statistics made twenty years ago, as compared with those made last year in one respect, and that is in the recorded cases dependent upon scarlatina, measles, and cerebro-spinal meningitis. I do not know whether this may not be apparent and not real, for as you know, Mr. President, this subject has been worked up in such a rudimentary way that we cannot place much reliance upon the facts or pseudo-facts at our disposal. I examined all the deaf mutes in Hartford, about the year 1868; then I examined all the deaf mutes in the Institution for the Improved Instruction of Deaf Mutes in New York last year, and I noticed this apparent discrepancy in the etiology. The deaf mutes in Hartford twenty

years ago were in larger proportion deaf from what Professor Bell aptly calls adventitious causes of a certain kind, that is scarlet fever and measles. Of the inmates of the Institution for the Improved Instruction of Deaf Mutes in New York, a very small proportion are deaf from scarlet fever and measles, but a large proportion are deaf from what is called in these inaccurate tables, although they are to a certain extent entitled to reliance, cerebro-spinal meningitis. So far as this meagre comparison goes, suppuration of the ear is much less frequent in '85 than it was in '68. If true, this may be due to the fact that people all over the country have been taught to treat suppuration and rescue the children from nearly deaf-mutism, who formerly were turned into asylums simply because they heard very badly. In Hartford I found a patient who could hear a watch two or three feet away. A patient was brought to me within the last two weeks who could be made to hear twenty feet away with an artificial drum-head. These things are to be worked out by a committee as suggested.

The fundamental defect in these tables, and I have examined the inmates of three institutions, — the fundamental defect is that they are taken by incompetent observers. The examinations were made by persons utterly incapable of saying what was a cause and what was not. I think that with our present means of diagnosis we may put to one side a certain set of cases as purely congenital and in that class, as Professor Bell intimated to me in a private conversation, — correlated changes are often found. Defects in other parts of the body of these patients are often found. Spina bifida occurs in such cases. We have another class, — those who can be made to hear with such an instrument as that presented to-day and we can separate these from those that cannot be made to hear with any instrument. I think that we can go a step further, and show that all these children who hear with the tube or hear

better with the tube, do not undergo any physiological change at puberty; I do not think that there is any evidence to support that view, and I understand that Professor Bell does not think so;—but from favorable circumstances the influence of sound begins to act upon them. These people have trouble with the tympanum. You will remember those dissections of congenitally deaf cats which were made by Cumberbatch, who found only tympanic trouble in those examined.

I think with such a commission as has been suggested, we shall be able after two or three years to put to one side the congenital cases who are also often deficient in intellect, then on the other side, the acquired cases, and subdivide these into those who have affection of the whole ear, those who have affection of the tympanum alone and those who have suffered from nerve trouble. I think that with the speculum, the tuning fork, the speaking tube and the history as prepared by the otologist, we can do something. The first step must be to have connected with every institution a man capable of examining the ear who shall make a critical examination before the admission of the patient. He would want to follow up the history of these deaf mutes. Very often, it would be possible to get the history from near the time of birth.

But this is a very large field, which must be worked up for a long time before we can speak with any positiveness.

Professor Graham Bell:—I have been interested in the relation between the color of the skin and eyes and the condition of hearing in cats. I have studied deaf cats. I do not see why white cats with blue eyes should always be deaf. I now have two of these cats, a male and a female, and I hope bye and bye to be able to furnish Dr. Roosa with some subjects for dissection.

Dr. Charles H. Burnett:—I should like to ask Dr.

Roosa a question. It has occurred to me from what I have seen that perhaps so-called congenital deafness is a result of chronic catarrh—that a child who is supposed to be congenitally deaf, perhaps has really suffered from a no more severe process than a chronic catarrh of the middle ear soon after birth. What is Dr. Roosa's opinion?

Dr. D. B. St. John Roosa:—I am inclined to adopt your opinion. I think that the classification of congenital and acquired deafness is exceedingly faulty. I think that a large proportion of those called congenitally deaf are deaf from chronic catarrh and not from nerve trouble or a central lesion.

Dr. Lucien Howe:—It may be worth while to supplement what Professor Bell has said by calling attention to an interesting correspondence between himself and another gentleman in regard to deafness in white cats, which appeared in "Science," I think, about one year ago.

Dr. E. Williams, Cincinnati:—There is a great fault committed in assuming that those who inherit scrofulous disease in general, inherit directly a tendency to deafness. Nearly all these cases are due to disease of the cavity of the tympanum and are not strictly congenital, but they belong to scrofulous and diseased families. I am quite sure that in my own family, which was a very large one, we never sent for a doctor in any case whatever for any trouble of the eyes. I have known other families, nearly all of the members of which were afflicted in one way or another with disease of the eye.

In studying this question of hereditary tendency, it is important to make a distinction between the real hereditary condition and the tendency to scrofulous and other diseases which is the basis of a large class of cases.

Dr. Samuel Sexton, New York:—In regard to this subject, I would say that recently in analyzing 250 cases of deaf mutes from my note books, I was much surprised

to find that so few were actually congenitally deaf. The number seems to be exceedingly small.

Dr. Samuel Theobald, Baltimore:—In regard to the question of congenital deafness, as Professor Bell has said, the records of institutions are based chiefly on the statements of the patients themselves or their parents, and we know how faulty these are apt to be. I am inclined to think that the percentage of congenital deafness is small, and that we should make clearer distinctions between congenital deafness and an inherited tendency to deafness. In those cases of deafness in which the parents or grandparents have been deaf, we have, I think, an extremely intractable form of deafness, and in this class not much is accomplished by treatment.

I have long thought, although I have no pathological evidence to support the view, that in these inherited forms of deafness there is a tendency to anchylosis of articulations of the small bones of the middle ear, and especially of the stapes to the margin of the oval window. When we look into the ear, in cases of this character, we find little evidence of catarrhal inflammation, but with slight, possibly without any, true inflammation, decided sclerotic changes take place, and a high degree of deafness ensues.

Dr. Herman Knapp, New York:—I should like to say one word, and that is a word of caution, that we do not go too far in this direction. The more I examine children with the ophthalmoscope, the more frequently do I find changes in the optic nerve and yellow spot which I did not find formerly, because I did not get opportunities enough of examining very young children. If this is the case with the optic nerve, it is likely to be the case also with the auditory. The number of acoustic nerve and labyrinth disease may not be large, but I think there are such cases. I have myself examined deaf mute patients in whom nothing wrong could be detected on physical examination, so

that there was nothing left but to attribute their difficulty to an affection of the center of audition or of the acoustic nerve and its expansion.

Dr. D. B. St. John Roosa, New York:—In some of these cases might we not have anchylosis of the stapes with secondary changes in the nerve? Even after a thorough examination of the drum-head we have not settled the fact that the deafness may not depend upon tympanitic trouble at the last bone. The drum-head may move even if this is affected. I agree with the statement that there is a certain proportion of cases that have all the evidences of changes in the acoustic nerve and the central apparatus.

Dr. H. Knapp:—To suppose anchylosis of the stapes, when there are no changes in the bony system and the tympanum, is, I think, rather a bold diagnosis. Affections of the brain are frequent in young children, and their consequences may be deafness as well as blindness. When I examine deaf mute children and find no evidence of a cause for the deafness in the sound-conducting apparatus, I classify them under the same head with congenital blindness. I have lately followed up the congenital changes in the retina and the optic nerve. They are more frequent than I had supposed, and what is remarkable, some of them are transient, especially those of the yellow spot.

Dr. W. W. Seely, Cincinnati:—There is another evidence that a large proportion of these cases are due to chronic catarrh, and that is the frequency with which the Eustachian tube is stopped. I have examined quite a large number of cases of congenital deafness, where there was no history except that of the parents. From the appearance of the ear, one could not infer any disease of the cavity of the tympanum. When the throat was examined there was some evidence of catarrhal inflammation. When I came to inflate the ear I found that the air would not go in, but by perseverance air could be gotten in, showing

that at some time the child had had more or less catarrh of the Eustachian tubes at any rate.

Dr. Charles H. Burnett:—Does Dr. Knapp incline to the view that a large number of the congenitally deaf are deaf from nerve lesion, rather than from tympanic lesion?

Dr. H. Knapp:—I think that deafness from nerve lesion constitutes the minority. In a certain number it may be due to insufficient clearing of the tympanic cavity which, all know, is at birth filled with mucus. The deafness may be due to catarrh in the majority of the cases, but what I mean to say is that this etiological factor should not be generalized to the exclusion of every other.

Dr. Oren D. Pomeroy, New York:—I would ask a question. I have seen a number of cases where one or both parents were syphilitic. We should expect that to be a frequent cause of deafness. I have seen a number of cases where I considered that to be the cause. I would ask if any one has had experience in this direction?

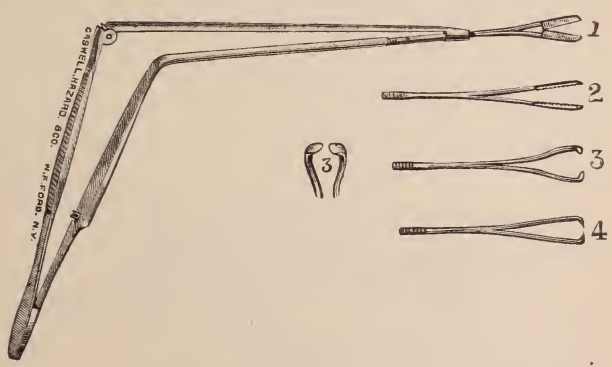
Dr. H. Knapp:—I would remark in regard to rickety children that some of them, up to the age of six or eight months, are so apathetic that you can obtain from them no information. You may ring the loudest bell, they make no sign of hearing it. At the same time there may be some optical defect, and you naturally infer that the child is deaf. Later they come out to hear quite keenly. This is evidently the result of their slow mental development.

EXHIBITION OF INSTRUMENTS.

COMBINATION EAR FORCEPS.

By Dr. S. Sexton, *New York, N. Y.*

Dr. Sexton, in presenting this instrument, said he had found after six years' experience that the Canula aural foreign body forceps, which he had described in the American Journal of Otology in 1880, worked so well in the ear and nose that he had for convenience adapted several operating points to the same handle. The combination as shown in the cut had been found so satisfactory to himself he now ventured to offer it to others. The arrangement is well explained by the accompanying cut; the



handle as seen in the illustration is mounted ready for use with a scissors point (1) made after the well known sheep-shears pattern. It has been found useful in trimming away redundant tissues from the walls of the external auditory canal.

No. 2 is a serrated dressing forceps point.

No. 3 is a cutting forceps intended for the removal of polypoid or other tissue which may lie on the inner wall of the tympanum and contiguous region, or in a position not accessible to the scissors, or in snipping off small adenoid growths from the inner wall of the visible pharynx.

No. 4 is the attachment with needle points for the removal of foreign bodies already alluded to.

These various points will be found to have their use in the nasal cavity as well as in the ear.

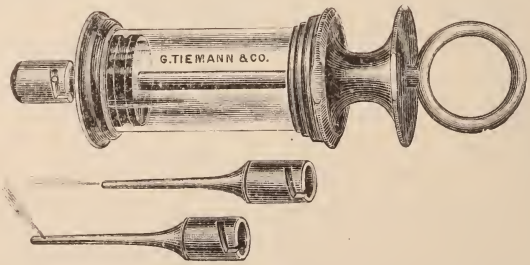
The forceps are one third ($\frac{1}{3}$) larger than shown in the cut.

The set is manufactured and put up in a case by Mr. Ford, of Caswell, Howard & Co., New York.

A GLASS AURAL SYRINGE.

By Dr. S. Sexton, *New York, N. Y.*

Dr. Sexton also showed to the members of the Society a glass aural syringe with vulcanite rubber mountings and tips. Dr. Sexton said that he had been on a certain occasion very much surprised to find greenish pus in the ear of a patient which he subsequently found was owing to the verdigris which had formed in a brass syringe. In order to avoid the constant presence of this substance in the



water used in syringing he had had a syringe made in which

no metal whatever was employed. The instrument shown in the wood-cut has the advantages of being very light and working free enough to be charged with one hand. It is so made that a little water always remains in the forward end of the barrel after using, which keeps the packing constantly moist. Evaporation of the water is prevented by the attachment of a vulcanite cap, when the instrument is not in use. This syringe, even if not used for a long time, will thus be found in working order whenever wanted.

It is provided with two tips, which, like the cap-attachment referred to above, can be fitted on to the barrel by means of a bayonet fastening. One of the tips supplies a small direct current of water, from the other a stream is emitted at a right angle with the long axis of the nozzle much nearer the point than shown in the cut, an arrangement found useful in syringing out the attic or into sinuses opening into the tympanum or the external auditory canal. The surgeon should always test these syringes before purchasing, since glass barrels are likely to vary in diameter at different points, thus preventing uniform action, and permitting the escape of water upon the operator during the back action of the piston. The advantage of inspecting the water through the barrel is manifest.

The syringe is more than twice as large as shown in the cut and carries nearly ℥iß of water; it is manufactured by G. Tiemann & Co., New York.

ALPHABETICAL INDEX*

OF

OTOLOGICAL LITERATURE, FROM JULY, 1884, TO JULY, 1885.

COMPILED BY

DR. GORHAM BACON, NEW YORK, N. Y.

AND

DR. FRANCIS H. BROWN, BOSTON, MASS.

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American Otological Society.

The Nineteenth Annual Meeting of the American Otological Society was held at the Pequot House, New London, Conn., on Tuesday, July 20, 1886, at 10.30 A. M., the President, Dr. J. S. Prout of Brooklyn, N. Y., in the chair.

The following members were present:—

Drs.	C. R. Agnew	New York, N. Y.
	J. A. Andrews	New York, N. Y.
	Gorham Bacon	New York, N. Y.
	A. H. Buck	New York, N. Y.
	F. P. Capron	Providence, R. I.
	W. H. Carmalt	New Haven, Conn.
	B. E. Fryer	Kansas City, Mo.
	J. Green	St. Louis, Mo.
	J. O. Green	Boston, Mass.
	Emil Gruening	New York, N. Y.
	E. E. Holt	Portland, Me.
	S. J. Jones	Chicago, Ill.
	H. Knapp	New York, N. Y.
	J. A. Lippincott	Pittsburg, Pa.

W. S. Little	Philadelphia, Pa.
A. Mathewson	Brooklyn, N. Y.
H. G. Miller	Providence, R. I.
H. D. Noyes	New York, N. Y.
O. D. Pomeroy	New York, N. Y.
J. S. Prout	Brooklyn, N. Y.
S. Sexton	New York, N. Y.
S. B. St. John	Hartford, Conn.
G. Strawbridge	Philadelphia, Pa.
Samuel Theobald	Baltimore, Md.
J. J. B. Vermyne	New Bedford, Mass.
D. Webster	New York, N. Y.

And by invitation:—

Drs. W. A. Bartlett	New York, N. Y.
L. S. Dixon	Worcester, Mass.
A. Duane	New York, N. Y.
E. Friedenberg	New York, N. Y.
A. A. Hubbell	Buffalo, N. Y.

The President appointed as the Business Committee Drs. Webster, Holt and St. John.

The Treasurer's report was read and referred to Dr. J. A. Lippincott as Auditing Committee.

The report of the committee on "Training and Development of the latent hearing of Deaf-Mutes" having been called for, the Secretary read a letter from Dr. C. H. Burnett, chairman of that committee, stating "that in his opinion the subject pertains more to the pedagogics of the mute, than to the business of the aurist, and requesting that the committee be discharged."

On motion of Dr. Agnew the Society voted to discharge the committee.

Dr. Knapp, chairman of the committee to report on a "Uniform method of recording the hearing power," reported progress and requested a continuance of the committee for one year.

On motion of Dr. J. Green the Society voted to continue the committee, to report at the next Annual Meeting.

The Auditing Committee stated the report of the Treasurer to be correct and the accounts properly vouched for; the Treasurer's report was then accepted.

A communication from Dr. Mastin of Mobile, Ala., and others, upon the subject of a Congress of American Physicians and Surgeons, was referred to the Business Committee by the President.

The Business Committee reported on the order of papers to be read and recommended that the Society adjourn at 1.30 P. M., and meet again at 8 P. M.

1. Dr. S. Sexton, of New York, N. Y., read a paper entitled: "Acute and chronic purulent inflammation of the middle ear tract and their complications."

It was discussed by Drs. Agnew, Knapp, Webster, J. O. Green and Andrews.

2. The next paper was by Dr. A. H. Buck of New York, N. Y., "On painless and only slightly painful ulceration and perforation of the membrana tympani, probably of a tubercular origin."

Discussed by Drs. Sexton, Gruening, Agnew, Andrews, Webster and J. O. Green.

3. Dr. Buck also read a paper on "Certain technical details, relating to operations on the mastoid process."

Discussed by Drs. Theobald, Webster, Agnew, J. O. Green, Knapp, H. D. Noyes, Andrews, Gruening and Lippincott.

The Business Committee recommended that the President be authorized to appoint a committee of three members to take into consideration the communication of Dr. Mastin and others upon the subject of a Congress of American Physicians and Surgeons and to report the same to this Society at its evening session.

The President appointed as such committee Drs. Agnew, Knapp and J. Green.

At 1.30 P. M., adjourned.

Evening Session.

The President called the meeting to order at 8 P. M.

The records of the morning session were read and accepted.

The reading of papers was then continued.

4. Dr. H. Knapp, of New York, N. Y., "Fatal termination of a case of sclerosing mastoiditis after chiselling of the bone," and

5. Dr. O. D. Pomeroy, of New York, N. Y., "Abscess of the mastoid cells, where the main indication for operation was elevated temperature."

Both these papers were discussed by Drs. Sexton, Theobald, Gruening, Lippincott and Fryer.

The following papers were read by title and, with the above mentioned, referred to the Committee on Publications:

6. Dr. W. S. Little, of Philadelphia, Pa., "In the physiology of hearing is there an overlapping of each auditory field, the same as in the binocular field of vision?"

7. Dr. C. H. Burnett, of Philadelphia, Pa., "Two cases of chronic purulent inflammation of the tympanic attic, treated by peroxide of hydrogen."

8. Dr. Gorham Bacon, of New York, N. Y., "Two cases of ear disease from traumatism."

Dr. J. S. Prout, of Brooklyn, N. Y., made a few verbal remarks on the "Use of adhesive rubber plaster in covering perforations of the membrana tympani."

Discussed by Drs. Theobald and Holt.

Dr. S. Theobald, of Baltimore, Md., spoke about the use of "Apparatus for condensing and rarefying the air in the external meatus."

Discussed by Drs. Prout, St. John, Pomeroy and Sexton.

At 9.15 P. M., the Society went into Executive Session.

On the recommendation of the committee on member-

ship the following gentlemen were elected to membership by ballot:—

Drs.	J. B. Emerson	of New York, N. Y.
	J. O. Tansley	of New York, N. Y.
	J. L. Minor	of Memphis, Tenn.
	H. L. Morse	of Boston, Mass.
	Huntington Richards	of New York, N. Y.
	T. Y. Sutphen	of Newark, N. J.

The committee appointed at the morning session to consider the circular of Dr. Mastin and others with regard to the formation of a Congress of American Physicians and Surgeons, recommended "that a committee of five be appointed by the Society, which committee shall be authorized to confer with members from other medical associations with regard to the Organization of a Convention or Congress of such Associations, said committee to report at the next meeting of this Society."

The report was accepted, and after discussion by Drs. H. D. Noyes, J. Green, Agnew, Carmalt, Strawbridge, Theobald, Knapp, Fryer, Little and Webster, the resolution as reported by the committee was adopted.

Dr. Carmalt offered a resolution "that it is the sense of this Society that nothing in the resolution as adopted, shall be construed as implying the approval by this Society of any plan which shall involve the abandonment of its independent annual meetings at such time and place as it shall from year to year determine in accordance with its By-Laws." Accepted.

The President appointed Drs. Agnew, Knapp, J. Green, Carmalt and Strawbridge a Committee on Conference.

On motion of Dr. J. Green, the committee was empowered to fill vacancies.

The Business Committee reported the following list of officers for the ensuing year:—

President	Dr. J. S. Prout, of Brooklyn, N. Y.
Vice President	Dr. S. Sexton, of New York, N. Y.
Secretary and Treasurer	Dr. J. J. B. Vermyne, of New Bedford, Mass.
Committee on Membership.	Dr. Gorham Bacon, of New York, N. Y. Dr. W. S. Little, of Philadelphia, Pa. Dr. E. W. Bartlett, of Milwaukee, Wis.
Committee on Publications.	Dr. J. J. B. Vermyne, of New Bedford, Mass. Dr. C. J. Blake, of Boston, Mass. Dr. J. O. Green, of Boston, Mass.

These officers were duly elected by ballot.

The Business Committee further recommended that this Society hold its next Annual Meeting the day before the meeting of the American Ophthalmological Society and at the same place. Adopted.

The Society accepted the offer made by Dr. Gorham Bacon, of a continuation of the Alphabetical Index compiled by himself and Dr. F. H. Brown, of Boston, Mass., in the transactions for the current year.

Dr. D. Webster moved the publication of the post office addresses of the members, as well as the names, in the transactions of the Society. Adopted.

On motion of Dr. H. D. Noyes the Society passed a vote of thanks to their presiding officer, and after reading the records of the evening session adjourned at 10.30 p. m.

J. J. B. VERMYNE,

Secretary.

TWO CASES OF CHRONIC PURULENT INFLAMMATION OF THE TYMPANIC ATTIC, TREATED WITH PEROXIDE OF HYDROGEN.[1]

By Charles H. Burnett, M. D., *Philadelphia, Pa.*

The first case is that of Mr. E. R. D., age 37, who has been under observation, at intervals, since October, 1882. Two years previous to this date he was said to have had an abscess in the left auditory canal. The membranæ on both sides are thickened, and the patient is hard of hearing from chronic aural catarrh, dating from childhood. Since the "abscess in the left ear," which was most probably an acute otitis media located in the attic, there has been at times a scanty, thick, offensive, dark brownish yellow discharge from this ear. Inspection revealed an apparently ulcerated spot at the junction of the membrana flaccida with the upper wall of the auditory canal. This proved to be a small perforation in the membrana flaccida, the cutaneous periphery of which was red and tumid, so that the observer could not see into the cavity behind it. The escape of pus from the perforation and the entrance of a probe into it aided a diagnosis of its existence. The matter which came from this perforation was not copious enough to flow downward over the membrana proper, but clung to the upper wall of the canal. It has rarely been copious enough to escape from the meatus, but has always been thick and scanty, showing a tendency to form a creamy film on the upper wall of the auditory canal. Fre-

[1]Read by title at the Annual Meeting.

quently within the last four years the discharge has stopped for quite long periods, apparently from the healing of the cutaneous edge of the perforation, and not from the cessation of the attic disease. The discharge, at these times, would suddenly stop, and as suddenly burst out again, independent apparently of treatment, or of any excitant. The general health of the patient is good, and his hygienic surroundings all that wealth can give.

The treatment has been varied and manifold both in matter and manner. The insufflation of powders has proved inefficient in this case, simply because the powder could not reach the inflamed attic, through the small perforation. The indication, of course, has been to use solutions by means of the tympanic syringe, and this has been done with varying and, on the whole, only partially satisfactory results. Upon one occasion nearly two and a half years ago, upon a return of the discharge, I injected, by the tympanic syringe, a few drops of a saturated solution of nitrate of silver. This caused instantaneously intense pain in the ear, running down to the fauces, and behind the ear. This was in December, and the patient exposed himself, while having a cold, to cold damp weather, so that a few days later there developed an acute attack of inflammation in the attic cavity, and the patient was confined to his bed for some weeks with great pain in the tympanic region, accompanied by dizziness, hebetude and low pulse. The discharge from the perforation at this time ceased, and finally an incision was made into the membrana flaccida at a point corresponding to the old perforation, which had assumed the appearance of a pointed abscess. This gave vent to a little pus, and the patient rapidly recovered and left his room.

Cleansing the external ear with syringing and instilling alcohol reduced the discharge to a minimum, and the patient, thus provided with treatment he could carry out,

went to Europe. The condition of the left ear varied until February of this year, when, the discharge becoming more frequent and offensive, he placed himself under my treatment again. Nothing I had done heretofore had been able to cure the attic disease, and the perforation in the membrana flaccida had become larger and the neck of the malleus could be seen through it.

I now determined to thoroughly cleanse the attic of pus and any inspissated purulent masses by using the peroxide of hydrogen. This was done by means of the tympanic syringe two or three times a week. The first syringeful has always produced the characteristic foaming, and sometimes the second syringeful has done the same. As soon as the peroxide returns from the cavity without producing foaming, I have then injected 3%–10% solution of carbolic acid. The weaker solution is the better, as the stronger seems to irritate. Under this treatment, with peroxide of hydrogen as the cleanser, and the weak carbolic acid solution as an antiseptic and promoter of cicatrization, the ear has greatly improved. One element of doubt, existing heretofore, viz: as to the entire cleansing of the attic, has been cancelled by using the peroxide of hydrogen.

During the last month I have not been obliged to see the patient oftener than once a week, when an injection of only the peroxide has been made. In the interim of these applications the patient has used instillations of alcohol and water at home twice or thrice weekly. The discharge is still purulent but reduced to a minimum of a few drops a week; the hearing has greatly improved, viz: from 0 to 3 feet for the voice.

The *second* case is that of a lady, thirty years old, who had had scarlatina in childhood. There has been otorrhœa on the right side ever since, with the exception of five years, some years ago. Inspection reveals an entire de-

struction of the membrana tympani below the folds, and of the membrana flaccida above the folds and suspensory axial ligament, the latter remaining intact. All the ossicles can be seen in situ, from the head of the malleus to the stapes. The hearing is nearly normal. In the attic there was a large drop of greenish gray pus, covering the head and neck of the malleus. When this was mopped away, the inner wall of the attic was found rough and white. The discharge seemed to form in the upper part of the attic behind the tympanic edge of the upper wall of the auditory canal, at a point invisible from without.

The attic cavity was syringed by means of the tympanic syringe, with undiluted peroxide of hydrogen, and then with a 5% solution of carbolic acid. After four such applications the discharge ceased and did not return, during the month the patient remained under observation. The discharge had been quite copious for some months before the peroxide of hydrogen was used. The patient went to California in June, and has not been heard from since.

In the peroxide of hydrogen, therefore, we have an efficient, non-irritant cleanser of pus cavities. Its chemical formula is H_2O_2, and it is made by the reaction between hydrochloric acid and peroxide of barium ($BaO_2 + 2HCl = BaCl_2 + H_2O_2$). I have not seen that it has any other property in the treatment of aural disease—though this a most valuable one—than to break up pus by reason of its affinity for albuminous matter.

As such, it seems to me a most valuable aid to the aurist, especially in the treatment of inflammation in the attic, accompanied by perforation in the membrana flaccida.

IN THE PHYSIOLOGY OF HEARING IS THERE AN OVERLAPPING OF EACH AUDITORY FIELD, THE SAME AS IN THE BINOCULAR FIELD OF VISION?[1]

By William S. Little, M. D., *Philadelphia, Pa.*

In several cases of one sided deafness, the normal organ of hearing has been tested and the limit of the auditory field for one ear by the watch, at a distance of two feet, has been made out. The test has been made in cases of one sided nervous deafness, allowing no interference with the normal ear tested; also in cases, where the acuity of hearing was reduced in one ear, to recognizing the watch, only on contact; due to loss of membrana tympani, displaced ossicles, or middle ear disease. The watch is heard by the normal ear in these cases of one sided deafness, held at two feet distant from the head, to about ten degrees to the other or opposite side of the median line of the head of the ear tested; in front, behind and almost to the same extent over the head. The farther distance into space this line at an angle of ten degrees passes obliquely, it gives a larger area from which sources of sound can be recognized in front, above, and behind the head. With both ears in a normal state to recognize sound, there exists on each side of the median line, drawn through the head from before backwards, an area, to the extent of ten degrees to each side of the median line or twenty degrees for both ears, in which sounds are recognized simultaneously and almost equally by both ears; outside of this area, to the right,

[1] Read by title at the Annual Meeting.

the right ear hears singly; to the left, the left ear hears singly to better advantage. The intensity of sound, its pitch and quality, have not been studied in this area, it is not inferred that sound may not be so loud or near that it can not be recognized in a larger area, by both ears at once. The test has been made only with the watch; the tuning fork can be recognized by vibration up to this line, but as a sound with musical tone does not approach the median line for one ear alone. The advantage of binocular single sight, within the area of the horopter, is a great aid in maintaining our position, forming our judgment in relation to objects about us and in space; does not this overlapping of both auditory fields in this area described have its influence in our relations to objects that are a source of sound? By this overlapping we can face a speaker or singer or source of sound, without turning one ear or the other for better information; by means of it, we are protected from objects approaching us, when vision does not help us; the directions from which sounds proceed are readily recognized, and we have the advantage of double hearing as produced in this area. I would not restrict this area to twenty degrees, as in some cases where acuity of hearing is greater or less, it ranges a few degrees one way or the other.

Sudden loss of hearing in one ear places an individual in a very untried and annoying position; the direction from which sounds proceed is misjudged, the head has to be turned to bring the good ear into a proper position to hear; when called or addressed by persons unseen, he is apt to look the wrong way and is perplexed by all sounds. Experience gives the individual some relief, but the annoyances are greater than what has been expressed by those who are suddenly subjected to the loss of an eye.

The acuity of hearing for one ear alone is most distinct or the greatest in the region in front of it, yet in

double hearing, that is normal, there is slight movement of the head to bring either ear into use, in an auditorium or in conversation with others. In deafness affecting both ears so that these areas do not approach, it is as annoying as total one sided deafness. The works on Acoustics and Otology, as far as I have reviewed, give no information on this subject, but the observation of these areas, in cases of one sided deafness has been interesting and led me to present the subject. Dr. C. H. Burnett, in his Treatise on the Ear, speaks of the necessity, when testing cases of one sided deafness, to be careful that the affected ear has nothing attributed to it that is really heard by the better ear.

The medium which the auditory nerve responds to differs so from that which acts upon the terminal elements of the optic nerve; the origin, course and distribution of terminal elements of the two nerves differ also so much; the optic nerve originating more centrally in the cerebral substance, and having commissural connection and decussation of the fibres of each, that too close an analogy can not be drawn between the auditory and visual act. Vierordt in his Physiology, says the perception of the direction of sound is far behind the perception of direction by the visual act (P. 333). The impairment of the auditory fields, either from cerebral disease, where the auditory nerve originates, or from disease of the nerve itself, is as readily recognized as limitations in the visual fields, from cerebral or optic nerve disease. Disease of the middle ear, ossicles or membrana tympani, affect the auditory fields, as lesions of transparency in the media of the eye do the visual field. The treatment of ear disease with its varying degrees of deafness, should be continued till these fields are reëstablished, each auditory field coalescing in the area spoken of, if this is possible to be attained; this applies not only to cases of one sided deafness, but also where both fields pre-

sent with limitations for the watch, inside of this area. In testing for the watch, not only the area immediately in front of the ear should be tested, but also how far in front, over and behind the head, the ear gives a response to its sound.

The watch used in the testing of these cases can be heard at a distance of fifteen feet.

TWO CASES OF EAR DISEASE DUE TO TRAUMATISM.[1]

By Gorham Bacon, M. D., *New York, N. Y.*

Case I.—Injury to the membrana tympani from the twig of a tree.

A. M. O., æt. 48, a resident of New Jersey and farmer by occupation, came to see me April 21, 1885. He says that previous to this accident, he never had any ear disease and that he has no hereditary tendency to deafness; he has always been a healthy man; when he takes cold, however, it generally "goes to his head".

Two months ago, when walking through the woods in Florida, a twig from the end of a bough penetrated the right auditory canal. He immediately felt a sharp pain and everything seemed blurred for a few seconds; there was considerable bleeding from the canal, which continued for some time; the pain, which was sharp, recurred at intervals for a day and a roaring noise in the ear (like a piece of wood, slashing around in a pail of water) commenced soon after the accident, which, though worse at times, has been present ever since. The ear discharged a thin watery fluid a day or two after the injury, and continued for three weeks. He says he was not dizzy at all after the accident. He did not consult any physician at the time, as there was none at hand, but put some laudanum into the ear. On returning to New Jersey a physician there advised him to syringe the ear with tepid water and

[1] Read by title at the Annual Meeting.

drop in sweet oil, this being all the treatment he has received up to the present time.

Examination.—The right membrana tympani congested around Shrapnell's membrane and along the handle of the malleus; also very much retracted with the posterior fold of the membrane and the short process very prominent; the cone of light is foreshortened and there are several opacities in the lower part of the membrane. The left membrana tympani is fairly normal, although slightly opaque and retracted, and there is some congestion about the short process: the cone of light extends almost to the periphery.

The patient has some chronic naso-pharyngeal catarrh.

Hearing distance, acoumeter, right ear 6 inches; left ear 9 feet. When the tuning-fork is placed on the vertex cranii, the sound is referred to the right ear; the aerial conduction is better for both ears than the bony; that is, a vibrating tuning-fork is heard louder when held in front of each ear at a distance of two inches than when placed on the mastoid process.

By Politzer inflation, air passes into both middle ears, but the right Eustachian tube is more pervious than the left one. There is also after inflation some bulging of the posterior inferior quadrant of the right membrana tympani, and the hearing distance for the acoumeter is increased to right ear 12 inches, left ear 12 feet.

Case II.—Pistol shot wound of the right mastoid process.

Annie B., æt. 23, a native of the United States, consulted me Feb. 10, 1885, at the N. Y. Eye and Ear Infirmary. Before receiving this wound, she never had any deafness or tinnitus. She is not subject to head colds, but is very anæmic in appearance. Last June, she says, a man standing about 6 feet behind her, accidentally fired a pistol which he held in his hand and the bullet struck

her, just behind the right ear. She was not unconscious at the time, but suffered excruciating pain. She was taken to the Chambers Street Hospital and immediately put under ether. She did not notice that she was deaf till after she came out of the ether and four days after this, she first noticed a singing noise, which has been present at times ever since. She is more deaf and has more tinnitus during damp weather, and about five o'clock every day she observes that she cannot hear as well as in the morning. She also says that every night since she was shot, she experiences a numb sensation in the ear.

She remained in the hospital about two weeks.

About four months ago, when putting a hair-pin in the right auditory canal to relieve an itching sensation, she ran it against a hard object just inside of the meatus. She was prompted to seek advice at the Infirmary because night before last, she had a severe ear-ache and all day yesterday, some bloody matter came from the right ear; the deafness and noises have remained about the same as at first; she feels that same numb feeling in the ear, which has been there since the accident.

Examination.—The left membrana tympani is dull, very much retracted and thickened.

The right membrana tympani not seen, as the canal contains a loose sequestrum of bone and there is a bulging of the posterior wall; the protuberance or bulging commences just inside of the meatus; the anterior wall of the canal is inflamed. There is a cicatrix over the mastoid process about 1 inch long, $\frac{1}{2}$ inch behind the auricle, the depression where the bullet entered being on a level with the upper wall of the auditory canal and about $\frac{3}{4}$ inch behind the attachment of the pinna. Hearing distance: acoumeter, right ear 0, left ear almost normal.

A tuning fork on the vertex is not heard with either ear, but when placed against the teeth is a little louder in the

right ear. The bony conduction is better than the aerial in the right ear and vice versa for the left ear.

Operation.—Ether given by the Resident Surgeon, Dr. Walker, the sequestrum of bone lying in the canal was removed. The swelling on the posterior wall of the canal, round and hard, had every appearance of being the bullet beneath the lining membrane of the canal. An incision was made through the tissues covering this protuberance, but it proved to be necrosed bone. Several pieces of bone were removed from the posterior wall, so that an opening was made through to the mastoid cells; some lead came away also. The hemorrhage being profuse and the opening so small, it was considered advisable to trephine the mastoid. Some more pieces of bone were removed through this opening behind the auricle. The bullet was firmly imbedded in the mastoid cells, lying against the inner wall of the mastoid cavity, close to the antrum; it was very much flattened out and firmly adherent. The patient's pulse suddenly becoming very weak, any further procedure was stopped, as she had been under ether for some time. The mastoid cavity and parts were washed thoroughly with a solution of bichloride of mercury 1-1000 and iodoform insufflated and a plug of lint inserted in the opening made by the trephine.

Feb. 12, the patient has had no bad symptoms since the operation. Hearing distance, acoumeter, right ear 3″.

Feb. 13, no pain in the ear; it hurts her to open her mouth in eating; no headache nor any bad symptoms; the canal is somewhat inflamed near the external meatus. The cotton was partly removed from the wound over the mastoid and the sinus through the posterior bony auditory canal and the parts were syringed as before with the bichloride solution and dressed with iodoform. The hearing distance improved to 6″ for the acoumeter, and she hears the cars passing the door now, which she could not

do before the operation. The bullet is seen through the mastoid opening, close to the antrum and firmly adherent. Any attempt to remove it causes great pain and cannot be done without again giving the patient ether, which she refuses to have done. The patient refused to remain any longer in the hospital, but promised to return, however, and have the bullet removed in a few days. She came back, but said her friends would not allow any further operation.

Feb. 16. Temp. 99½ F. at 5 P. M. Same dressing as before; any attempt to remove the bullet ineffectual, as it caused too much pain; some lead was cut and scraped from the remains of the bullet several times and the patient was treated as an out-door patient. No membrana tympani can be discovered in the right canal.

Feb. 17, the patient had considerable pain from 7 P. M. till midnight, also fever and sweating. Hearing distance, acoumeter 21″: she hears very much better.

March 6. During the past two weeks, the patient has been attending at the Infirmary twice a week and the same treatment has been followed out. The wound has been closing very rapidly, so that it was impossible to remove any more lead. There is bulging of the posterior and upper part of the inner end of the bony auditory canal, and the passage does not look very well between the mastoid cells and auditory canal. The patient has had headache, also chills at night since day before yesterday, followed by fever. Acoumeter, right ear 0.

March 10, hearing distance, acoumeter 30″. The tuning fork on the vertex is heard better in the left ear, also when placed on the teeth; the aerial conduction is better than the bony; the bulging of the canal is less; less discharge also; the mastoid opening has closed up very much; same treatment continued.

After this date, the patient was not seen again, as she

disappeared, nor could any trace be found of her. Very little could be done for the patient after she left the Infirmary as an in-door patient, as she was a woman of bad character, who stimulated freely and was very much broken down in general health. When last seen, the sinuses through the posterior bony auditory canal and behind the auricle were closing rapidly and the discharge had become slight. It was unfortunate that the patient would not take ether a second time, that the remaining portion of the bullet could have been removed, and also that she would not remain long enough in the Infirmary to receive appropriate treatment and care.

This patient and the first one are interesting cases on account of the nature of the injuries received. Gun-shot wounds of the hearing apparatus are very infrequent, although instances have been reported by Buck, Politzer, O. Wolf and others.

In the first patient, the membrana tympani was undoubtedly ruptured by the twig of the tree, from the appearances of the drumhead and the history of the case. It is seldom that such accidents occur, only a few having been recorded.

THE DIAGNOSIS AND TREATMENT OF ACUTE AND CHRONIC PURULENT INFLAMMATION OF THE MIDDLE EAR TRACT AND THEIR COMPLICATIONS.

By Samuel Sexton, M. D., *New York, N. Y.*

The basis on which this subject will be discussed is the records of 2366 selected cases from over 20,000 cases seen in private and hospital practice. They are divisible into three classes, viz. :—

I.	Acute purulent inflammation of the middle ear tract	739
II.	" catarrhal " " " "	245
III.	Chronic purulent " " " "	1382
	Total.	2366

The following tables are the result of an analytical review of the records of these cases. [The cases selected from the notes of the past two years are appended to each group but the age and sex are omitted. It may be assumed, however, that they do not differ in this respect from the others.]

Acute Purulent Inflammation of the Middle Ear Tract.

Cases under one year of age:

Males.			Females.		
9 weeks	=	1	6 weeks	=	1
2 months	=	1	10 weeks	=	1
3 months	=	1	2 months	=	2
4 months	=	1	5 months	=	1
5 months	=	1	9 months	=	1
7 months	=	1	10 months	=	1
9 months	=	1	12 months	=	1
10 months	=	2			8
11 months	=	2			
		11			

	Males	Females		
Under 1 year of age as above given	11	8	= 19	
Between 1 and 2 years	4	6	= 10	
Between 2 and 3 years	8	11	= 19	=22½ per cent.
Between 3 and 4 years	4	6	= 10	
Between 4 and 5 years	5	11	= 16	
Between 5 and 10 years	14	16	= 30	
Between 10 and 20 years	47	20	= 67	=14⅕ per cent.
Between 20 and 30 years	93	33	=126	=26⅔ per cent.
Between 30 and 40 years	54	25	= 79	=16⅔ per cent.
Between 40 and 50 years	34	18	= 52	=11 per cent.
Between 50 and 60 years	22	8	= 30	= 6⅓ per cent.
Between 60 and 70 years	8	2	= 10	= 2⅓ per cent.
Between 70 and 80 years	2	1	= 3	
Over 80 years	1		= 1	
	307	165	=472	=Total.
Cases from records of past 2 years	=162	105	=267	
	469	270	739	=Total.

Of the 739 cases of acute purulent inflammation of the middle ear tract, among the PREDISPOSING CAUSES were:

Heredity . . . . . in 6 cases.
Phthisis . . . . . in 6 cases.
Previous aural disease . . . . . in 44 cases.
Neurasthenia . . . . . in 24 cases.
Acute and chronic catarrh of upper air-tract, incl. hypertrophic tonsils . . . . . in 369 cases.
Oral irritation, comprising dentition, diseased teeth, etc. . . in 349 cases.
Disturbances of the genital organs . . . . . in 24 cases.

THE PRINCIPAL ACTIVE CAUSES WERE:

Syphilis . . . . . in 7 cases.
Sea-bath . . . . . in 75 cases.
Traumatism . . . . . in 54 cases.
Mal-treatment of chronic purulent inflammation . . . . . in 34 cases.
Exposure . . . . . in 27 cases.
Exanthemata, { Scarlatina . . . . . in 7 cases.
Rubeola . . . . . in 12 cases.

The following are some of the symptoms and pathologi-

cal conditions, occurring in the history and progress of the disease:

Severe pain and grave symptoms . . . . . in 74 cases.
Distressing autophonia . . . . . in 39 cases.
Vertiginous phenomena . . . . . in 55 cases.
Drainage through the Eustachian tube . . . . . in 3 cases.
Teat-like formations . . . . . in 16 cases.

Acute Catarrhal Inflammation of the Middle Ear Tract.

	Males	Females		
Under one year of age	1*		= 1	$=13\frac{2}{3}$ per cent.
Between 1 and 2 years	1		= 1	
Between 4 and 5 years	2	1	= 3	
Between 5 and 10 years	1	5	= 6	
Between 10 and 20 years	11	3	=14	$=18\frac{2}{3}$ per cent.
Between 20 and 30 years	12	4	=16	$=19\frac{2}{3}$ per cent.
Between 30 and 40 years	14	9	=23	$=28\frac{1}{2}$ per cent.
Between 40 and 50 years	7	3	=10	$=12\frac{1}{2}$ per cent.
Between 50 and 60 years	3	1	= 4	= 5 per cent.
Between 60 and 70 years	2		= 2	$= 2\frac{1}{2}$ per cent.
	54	26	=80	Total.
Cases from records of past 2 years=	110	55 =	165	Total.
	164	81 =	245	=Total.

*This patient was 8 months of age.

Of the 245 cases of acute catarrhal inflammation of the middle ear tract, among the PREDISPOSING CAUSES were:

Heredity . . . . . in 3 cases.
Acute and chronic catarrh of the upper air-tract, including hypertrophic tonsils . . . . . in 153 cases.
Oral irritation, comprising dentition, diseased teeth, etc. . . in 171 cases.
Disturbances of the genital organs . . . . . in 21 cases.

THE PRINCIPAL ACTIVE CAUSES WERE:

Syphilis . . . . . in 3 cases.
Sea-bath . . . . . in 48 cases.

Traumatism . . . . . in 15 cases.
Exposure . . . . . in 9 cases.
Exanthemata, { Scarlatina . . . . . in 3 cases.
Rubeola . . . . . in 6 cases.

Symptoms and pathological conditions occurring in the history and progress of the disease:

Severe pain . . . . . in 12 cases.
Vertigo . . . . . in 6 cases.
Distressing autophonia . . . . . in 12 cases.
Mal-treatment . . . . . in 9 cases.
Mal-treatment greatly increased the severity of the symptoms in 12 cases.

Chronic Purulent Inflammation of the Middle Ear Tract.

CASES UNDER ONE YEAR OF AGE:

MALES.		FEMALES.	
4 months	= 1	2 months	= 1
7 months	= 1	3 months	= 1
8 months	= 2	4 months	= 1
9 months	= 1	5 months	= 1
	—	6 months	= 1
	5	8 months	= 1
			6

	Males	Females		
Under one year of age as above given	5	6	= 11	
Between 1 and 2 years	14	5	= 19	
Between 2 and 3 years	15	16	= 31	=29$\frac{1}{9}$ per cent.
Between 3 and 4 years	12	20	= 32	
Between 4 and 5 years	5	19	= 24	
Between 5 and 10 years	72	100	=172	
Between 10 and 20 years	169	124	=293=29$\frac{3}{5}$ per cent.	
Between 20 and 30 years	127	70	=197=19$\frac{2}{3}$ per cent.	
Between 30 and 40 years	63	42	=105=10$\frac{1}{2}$ per cent.	
Between 40 and 50 years	31	29	= 60= 6$\frac{1}{25}$ per cent.	
Between 50 and 60 years	29	9	= 38= 4 per cent.	
Between 60 and 70 years	8	1	= 9= 1 per cent.	
Between 70 and 80 years	2		= 2	
	552	441	=993 Total.	
Cases from records of past 2 years=	205	184	=389	
	757	625	=1382=Total.	

Of these 1382 cases of chronic purulent inflammation of the middle ear tract, the principal PREDISPOSING CAUSES were:

Phthisis		in 13 cases.
Dyscrasia.	Hip joint disease	in 7 cases.
	Scrofulosis	in 3 cases.
Neurasthenic and vasomotor disturbances		in 45 cases.
Rheumatism		in 9 cases.
Acute and chronic catarrh of upper air-tract, including hypertrophic tonsils		in 543 cases.
Oral irritation, comprising dentition, diseased teeth, etc.		in 525 cases.
Disturbances of the genital organs		in 33 cases.

AMONG THE ACTIVE CAUSES WERE:

Syphilis		in 23 cases.
Sea-bath		in 81 cases.
Traumatism		in 27 cases.
Mal-treatment		in 15 cases.
Exposure		in 7 cases.
Turkish bath		in 3 cases.
Exanthemata,	Scarlatina	in 141 cases.
	Rubeola	in 48 cases.
Vaccina, cow-pox		in 2 cases.
Diphtheria		in 8 cases.
Croup		in 1 case.
Small-pox		in 2 cases.
Pertussis		in 4 cases.
Parotiditis		in 1 case.
Typhoid fever		in 3 cases.
Pneumonia		in 1 case.

Symptoms, pathological conditions, history and progress of the disease:

Vertiginous and reflex-phenomena	in 95 cases.
Recurrent exacerbations ("Gatherings")	in 48 cases.
Polypi	in 135 cases.
Granulations	in 40 cases.
Acute exacerbations	in 52 cases.
Autophonia	in 21 cases.
Ulceration of external auditory canal	in 41 cases.
Disease of external ear, eczema, etc	in 42 cases.

Severe Periostitis Interna and Externa (Mastoid Disease) Occurring with Acute Purulent Inflammation of the Middle Ear Tract.

CASES UNDER ONE YEAR OF AGE:

MALES.	FEMALES.
4 months = 1	2 months = 1
	3 months = 1
	10 months = 1
	11 months = 1
	4

	Males	Females		
Under one year of age as above . . given	1	4	= 5	
Between 1 and 2 years	2		= 2	
Between 2 and 3 years		4	= 4	=22½ per cent.
Between 3 and 4 years	3		= 3	
Between 4 and 5 years	1	2	= 3	
Between 5 and 10 years	4	6	= 10	
Between 10 and 20 years	10	6	= 16	=13⅓ per cent.
Between 20 and 30 years	15	12	= 27	=22½ per cent.
Between 30 and 40 years	15	6	= 21	=17½ per cent.
Between 40 and 50 years	8	8	= 16	=13½ per cent.
Between 50 and 60 years	7	3	= 10	= 8⅓ per cent.
Between 60 and 70 years	2		= 2	
	68	51	=119	=Total.

Of these 119 cases of "mastoid disease" with acute purulent inflammation of the middle ear tract, the principal PREDISPOSING CAUSES were:

Previous aural disease . . . . . in 2 cases.
Neurasthenic disturbances . . . . . in 3 cases.
Acute and chronic catarrh of upper air-tract, including hypertrophic tonsils . . . . . in 43 cases.
Oral irritation, comprising dentition, diseased teeth, etc. . . in 55 cases.
Disturbances of the genital organs . . . . . in 7 cases.

AMONG THE ACTIVE CAUSES WERE:

Syphilis . . . . . in 2 cases.
Sea-bath . . . . . in 7 cases.
Traumatism . . . . . in 6 cases.

Mal-treatment		in 13 cases.
Exposure		in 2 cases.
Exanthemata,	Scarlatina	in 1 case.
	Rubeola	in 2 cases.

The following are some of the symptoms and pathological conditions occurring in the history and progress of the 119 cases of "mastoid disease":

Vertiginous phenomena (grave symptoms)	in 20 cases.
Defective drainage from impacted polypi, etc.	in 14 cases.
Mastoid abscess	in 16 cases.
Tympano-mastoid abscess	in 12 cases.
Caries of antrum and auditory plate	in 3 cases.
Caries of cellules, perforative necrosis	in 4 cases.
Bell's palsy	in 2 cases.

Severe Periostitis Interna and Externa Occurring with Chronic Purulent Inflammation of the Middle Ear Tract.

CASES UNDER ONE YEAR OF AGE:

MALES.

6 months	=	1
7 months	=	1
		2

	Males	Females		
Under 1 year of age as above given	2		= 2	=40 per cent.
Between 1 and 2 years	1	1	= 2	
Between 2 and 3 years				
Between 3 and 4 years	2	2	= 4	
Between 4 and 5 years	2	3	= 5	
Between 5 and 10 years	8	7	=15	
Between 10 and 20 years	9	13	=22	=31 per cent.
Between 20 and 30 years	9	1	=10	=14 per cent.
Between 30 and 40 years	2	3	= 5	= 7 per cent.
Between 40 and 50 years	2	1	= 3	= $4\frac{1}{4}$ per cent.
Between 50 and 60 years	2		= 2	= $2\frac{2}{3}$ per cent.
Between 60 and 70 years	1		= 1	
	40	31	=71	=Total.

Of the 71 cases of "mastoid disease" with chronic purulent inflammation of the middle ear-tract, the principal PREDISPOSING CAUSES were:

Neurasthenic disturbances	in 2 cases.
Rheumatism	in 1 case.
Acute and chronic catarrh of upper air-tract, including hypertrophic tonsils	in 25 cases.
Oral irritation, comprising dentition, diseased teeth, etc.	in 27 cases.
Disturbances of the genital organs	in 1 case.

AMONG THE ACTIVE CAUSES WERE:

Syphilis	in 1 case.
Use of nasal douche	in 1 case.
Sea-bath	in 4 cases.
Traumatism	in 4 cases.
Maltreatment	in 3 cases.
Exposure	in 1 case.
Exanthemata, Scarlatina	in 12 cases.
Exanthemata, Rubeola	in 1 case.

The following are some of the symptoms and pathological conditions, occuring in the history and progress of the 71 cases of "mastoid disease" due to chronic purulent inflammation of the middle ear tract:

Vertiginous phenomena, grave symptoms	in 13 cases.
Defective drainage from polypi, etc.	in 9 cases.
Mastoid abscess	in 21 cases.
Tympano-mastoid abscess	in 9 cases.
Caries of antrum and auditory plate	in 21 cases.
Caries of cellules, perforative necrosis	in 16 cases.
Polypi	in 16 cases.
Bell's palsy	in 7 cases.

THE MORE GRAVE CASES:

There were 131 cases of acute and chronic suppurative inflammation of the middle ear tract with periostitis interna

or externa, or both, and consequent caries of the auditory plate, mastoid antrum and cellules, and other grave complications. Twelve of these cases terminated, sooner or later, fatally.

The ages of these were as follows:

	MALES.	FEMALES.	TOTAL.
Between 3 months and 1 year.	6	3	9
Between 2 years and 3 years.	3	1	4
Between 4 years and 15 years,	20	15	35
Between 16 years and 21 years.	13	10	23
Between 23 years and 35 years.	15	13	28
Between 36 years and 45 years.	13	9	22
Between 46 years and 61 years,	9	1	10
Totals.	79	52	131

Of the above 65 were acute and 66 were chronic.

In 44 there was periostitis externa.
In 32 there was mastoid abscess.
In 26 there was tympano-mastoid or dissecting abscess.
In 20 there was perforative necrosis of the cortex.
In 24 there was caries of the auditory plate, tympanic walls, etc.
In 9 cases there was facial paralysis.
In 27 cases there were polypoid tumors, fungosities, etc.

As regards the symptomatology:

In 35 cases there was an acute exacerbation of a chronic purulent process.

In 18 cases there were vertiginous phenomena.

In 18 cases meningeal pain and irritation were severe.

In 7 cases there were rigors and pyrexia.

In 7 cases exfoliation of sequestra took place through the external auditory canal.

In 8 cases exfoliation of sequestra took place through a post-aural sinus.

In 2 cases portions of the cochlea exfoliated; in both instances there were vertiginous phenomena.

In a few cases unilateral sweating of the head was observed to occur.

During the treatment of these 131 cases an incision over the cortex of

the mastoid was followed in 25 cases by decided relief and cessation of the aural discharge.

In 26 cases polypoid masses were removed.

The superior and posterior walls of the external auditory canal were incised in 15 cases.

Summary of Results.

Of the 131 severe cases the results were as follows:

Cured	57
Improved	9
Infirmary cases not returning after relief had been obtained, and in whom a chronic process probably continued to be neglected	53
Died	12
Total	131

The Twelve Fatal Cases.

No.	Sex.	Age	Diagnosis, History, Symptoms, etc.
1	Female.	31	Ch. Pur. Infl. of Atrium and Attic. Hemi-crania arising from reflex irritation from the aural disease and from the presence of diseased teeth. Defective drainage, tympano-mastoid abscess. Caries of the temporal and occipital bones. Pulmonary tuberculosis and œdema, death.
2	Male.	59	Ch. Pur. Infl. of Atrium and Attic. An acute exacerbation of the chronic disease with pent up secretions, tympano-mastoid abscess. Pain and autophonous phenomena, suicidal attempts. The patient recovered from this acute attack, but subsequently died of meningitis.
3	Male.	24	Ch. Pur. Infl. of Atrium and Attic. Phthisical history; drunkard; ozena, sniffing up salt water giving rise to an acute exacerbation. The patient was relieved of the immediate severe symptoms, and died, nine months after the aural treatment, of pneumonia and alcoholism.
4	Male.	32	Ch. Pur. Infl. of Atrium and Attic. Nasal douche giving rise to an acute exacerbation. Tympano-mastoid abscess appearing, the mastoid was trephined. The patient returned home in a broken down condition, and ultimately died. The cause of death could not be ascertained, but it was presumably due to alcoholism.
5	Male.	19	Ch. Pur. Infl. of Atrium and Attic. The patient was in a state of exhaustion consequent upon the irritation, etc., arising from the neglect of the aural disease. He ultimately died of phthisis.
6	Male.	44	Acute Pur. Infl. of Atrium and Attic. Defective drainage with pent up secretions, tympano-mastoid abscess. Unsuccessful attempts were made to relieve this condition by trephining the mastoid process; death from meningitis.
7	Female.	43	Acute Pur. Infl. of Atrium and Attic. Periostitis externa, caused by irritation of furuncle. Three trephining operations on the mastoid process. Death from meningitis.

No.	Sex.	Age	Diagnosis, History, Symptoms, etc.
8	Male.	46	Ch. Pur. Infl. of Atrium and Attic. Patient suffered from nervous exhaustion, and had several diseased teeth giving rise to irritation. Polypoid mass becoming impacted the escape of secretion was interfered with. Facial palsy appeared, symptoms of meningitis ensued and patient died. During the early stages of this case, the aural condition was much aggravated by the inordinate use of blisters and leeches, and by sniffing up salt water.
9	Male.	19	Acute Pur. Infl. of Atrium and Attic. Complete occlusion of the outlets of the attic occurring, the deeper parts became affected, facial palsy appeared, and the patient died of meningitis.
10	Male.	18	Ch. Pur. Infl. of Atrium and Attic. The patient was seen only once and did not at that time give any indications of grave aural disease. It was subsequently ascertained that he died of some brain trouble, the existence of aural disease not being suspected by the attending physician.
11	Male.	7 mos	Ch. Pur. Infl. of Atrium and Attic. There was a large lymphadenomatous tumor of the affected side of the neck. The impaction of polypus and improper treatment were followed by an extension of disease to deeper parts, caries of the atrium, antrum, tympanic and auditory plates. Facial palsy, purulent meningitis, death.
12	Male.	6 mos	Ch. Pur. Infl. of Atrium and Attic. The patient had facial palsy and the atrium was occupied by a polypoid mass. He was not brought again for treatment, and, it was discovered, died in convulsions a short time afterward.

Remarks on the Anatomy of the Ear.

In no disease of man is a knowledge of regional anatomy of greater service in diagnosis and treatment than in affections of the ear, and since purulent inflammation of the middle ear tract may assume a most painful and difficult aspect in persons at any age, it would be well to look also into the different stages of development of the temporal bone. Of this most complex of all the bones I am acquainted with no better practical description than Professor Leidy's, which divides it into the mastoidea, squamosa and petrosa. To begin with the first named:

According to Leidy[1] the *auditory plate* forms a broad archway between the mastoid and post-glenoid process, and extends inwardly as the roof of the external auditory meatus in the adult. "The inner extremity defines the meatus from the tympanic cavity by an acute curved ridge, from which a wide crescentoid plate, the *tympanic schute*, slants upward, and forms the outer boundary of the upper portion of the tympanic cavity. The schute is separated externally from the rest of the auditory plate by a spongy substance, but occasionally is continuous through thick, compact substance. Its anterior border joins the tympanic tegmen and its posterior border is continuous with the spongy substance of the outer wall of the mastoid antrum."

"The inner surface of the mastoid forms part of the posterior cranial fossa. Contiguous to the petrosa, it is impressed by the large curved channel for the lateral sinus."

A portion of the anterior surface of the petrosa constitutes the *tegmen*, a wide triangular plate covering the tympanum, the mastoid antrum and the beginning of the Eustachian tube. "The under part of the tegmen is

[1] Science, 1883.

commonly formed by a layer of spongy substance of variable thickness," says Leidy, and its upper surface is "more or less defined by a fissure, remaining as part of the petro-squamosal suture, which at birth extends from the notch at the bottom of the squamosa to that of its upper border. Frequently, also, a vascular groove, and several foramina for the transmission of vessels, mark the line of separation."

The tympanic cavity is divided by Leidy into two portions: "The main chamber, which may be named the *atrium*, situated directly opposite the external auditory meatus; and a recess above this, which may be distinguished as the *attic*." The atrium to superficial observation has been too often regarded as constituting the tympanum, but of far greater importance to the otologist is the attic, which lies above the point blank range of vision in inspecting the middle ear. The attic of the tympanum, pyramidal in shape, is situated over the atrium, and above the tympanic orifice of the external auditory meatus. It is separated from the cranial cavity by the tegmen. "Its inner boundary is a convex prominence produced by the contiguous portions of the external semi-circular and facial canals. Its outer boundary is the wide crescentic tympanic schute of the auditory plate. It opens above the prominence of its inner boundary, outward and backward, by a large aperture into the mastoid antrum. Beneath, it opens into the atrium by an elliptical aperture, formed internally by the ridge of the facial canal, and externally by the tympanic margin of the auditory plate. The attic is partially occupied by the mallet and anvil, which thence, by the handle of the former, and the long process of the latter, extend into the atrium."

"The mastoid antrum is a prolongation of the attic backward and outward in the spongy substance of the mastoidea. It is of variable size, ordinarily ranging from

that of the attic to double the dimensions of this. It sometimes ends in a blunt flask-like recess, but is oftener more or less extended downward among the cellules of the mastoid process. Frequently it gives off a smaller fork or passage, which is directed outward and upward among the cellules above the external auditory meatus; and rarely a third branch is directed more anteriorly."

"While the atrium of the tympanum varies but little in size, the attic and mastoid antrum vary greatly."

"The *mastoid cellules* consist of air cavities of variable number, size and extent, in the midst of the spongy substance of the mastoidea. They are commonly more or less pronounced in number and size with age. With the advance of years, they increase in both respects from the conversion of the ordinary marrow-filled, spongy substance into vacant spaces. Later they increase in capacity by expansion and coalescence, and proportionately decrease in number; and often in old age some of them even exceed in size the antrum. The cellules communicate with one another and, through the sides and extremity, with the mastoid antrum." They are separated from the lateral sinus by a thin plate of bone only.

Anatomy of the Child's Ear.—At birth the tympanum and mastoid antrum are about as large as they ever become in adult life: the petro-squamosal suture is but imperfectly closed, its external portion being anchylosed only near the time of birth, and is usually not obliterated until the end of the first or second year of life. It is always well marked in infancy and often remains imperfectly closed throughout life.

"The mastoid process, scarcely marked at birth, becomes conspicuous only after a year or two. The mastoid antrum is developed at birth; but the surrounding mastoid cellules undergo but little development until after puberty."

"The external auditory meatus is produced after birth.

The auditory plate forming its roof is gradually more differentiated from the rest of the squamosal, and its tympanic schute becomes more distinct by production of spongy substance between it and the roof of the meatus." The tympanic orifice is formed by the smooth auditory plate above which constitutes about one fourth of this bony circle and to which the superior border of the drumhead is attached; the lower three fourths is formed by the *annulus tympanicus*—a distinct plate of bone at birth, but afterwards forming the *tympanic plate*.

The manner in which the drumhead attaches itself to this orifice is of great interest in connection with inflammation of the attic.

Superiorly the membrana flaccida which is loosely connected with the upper margin of the aperture over which it passes to become continuous with the lining of the upper wall of the external auditory canal; the entire surface of the auditory plate being smooth the integument described glides over it with considerable freedom. At this portion of the ring the annulus tympanicus is not found. The membrana flaccida is much more distensible than the membrana vibrans, which latter portion of the drumhead is more firmly fixed into the grooved lower three fourths of the circle.

Under the pressure of retained fluids in the attic the membrana flaccida and membranous wall of the adjacent canal become easily distended.

The auricle and canal of the infant are soft and flabby; the former is not firmly fixed to the head and may be moved freely in all directions about its attachment; the walls of the latter lie in contact, the superior wall being the longest. The canal and drumhead are covered at birth with smegma, the removal of which by wiping may also detach the superficial epithelial layer. Tension requisite to the performance of its functions does not yet

exist in the transmitting mechanism, and hearing seemingly is slight.

The horizontal plane of the drumhead at this period is favorable to the occurrence of injury from the mere gravitation of fluid in the drum, and when distension occurs in consequence of profuse secretion it gives way readily.

The canal for the facial nerve lies like a ridge along the whole breadth of the inner wall of the tympanum just above the promontory; this, and the margin of the auditory plate opposite, limits the passage between the *atrium tympanicum* and the *atticus tympanicus*. The boundary is further restricted by foldings of the mucous lining of the tympanum in adapting itself to the chorda tympani. In the normal state, drainage from the attic is afforded by the débouchure of the Eustachian tube anteriorly, and by the hiatus behind the descending ramus of the incus, but the space between where the handle of the malleus and long process of the incus descend is almost impracticable for drainage.

Acute Purulent Inflammation of the Middle Ear Tract [inclusive of acute Catarrhal Inflammation].[1]

Acute inflammation of the mucous tract of the ear is practically a periostial inflammation by no means limited to that portion of the organ most easily seen, namely, the membrana vibrans, and the atrium of the tympanum which lies immediately beyond, the attic of the tympanum and the mastoid antrum and cellules seldom escaping. The periosteum covering the external auditory canal and the periauricular surface of the temporal bone is also liable to take on the same action; in fact, we have to deal with

[1] Acute catarrhal inflammation is considered along with acute purulent inflammation, since the pathological process is almost identical; the former, though, is milder in type and usually stops short of discharge through the drumhead.

this nutrient envelope of the bone which lines it both internally and externally in most instances.

Simple Inflammation of the Atrium may extend itself no further, but so soon as the attic takes on inflammation the process is nearly always propagated inwardly to the antrum and cellules and to a greater or less extent outwardly along the canal, over the cortex of the mastoid and periauricular region generally.

The symptoms are much more pronounced when both interior and exterior parts are affected at the same time, and the co-existence of periostial inflammation of the mastoid cellules and cortex is almost certain to cause caries of the bone.

Inflammation extends itself from the tympanum in this manner with great uniformity, but the attendant symptoms and course of the disease depend greatly on the age and condition of the patient: in other words, its slight or severe phases are due to constitutional influences.

Etiology.—Age and sex exert more or less influence in these cases; thus between the third and twelfth months 33 per cent. more males than females were recorded; in all of these reflex irritation due to first dentition, mal-nutrition, or dyscrasia, were the principal predisposing causes, whilst the exanthemata and acute catarrh of the upper air-tract were the principal exciting causes.

Between the ages of four and fifteen years second dentition, acute catarrh of the upper air-tract, hypertrophic tonsils, traumatism produced by blows on the ear, undue force exerted in the removal of foreign bodies from the organ, the entrance of sea-water in bathing, use of the nasal douche, and, lastly, the exanthemata were the more prominent causative agents. As regards sex, where females were the subject of irregular menstruation and the like they generally presented neuropathic symptoms, and among both sexes the effect of over-work, bad hygiene and neglect were notable.

Between the sixteenth and twenty-first years of age inclusive, disturbances of the genital functions were found to exert an exceedingly unfavorable influence; the effect of nervous exhaustion resulting from the abuse and perversion of this sense can scarcely be over-estimated. Phthisis and the results of exposure also frequently influenced the course of the disease, and sea-bathing was the exciting cause much more frequently than at an earlier age.[1]

From the age of twenty-three to thirty-five years inclusive, rhinitis, especially rhinitis sicca, exhaustion from intemperance, operations, abortion and other genital disturbances, the contamination of phthisis or syphilis, neurasthenia, the irritation from the difficult eruption of wisdom teeth, caries of the teeth and consequent alveolar abscess, collections of tartar on the teeth, etc., were found to often exert a predisposing influence; whilst the direct injury from sea-bathing, the use of the nasal douche, snuffing up salt water and other solutions were active causes. The unfavorable influences of mental worry and defective hygiene were at this period of life of even greater importance than before.

Patients between the ages of thirty-six, and forty-six years were found to be influenced by causes very similar to the foregoing group. Among females, however, the menopause now exerts an unfavorable influence in certain cases.

An account of purulent processes in the ear would be incomplete without allusion to some of the unwarrantable procedures that only too frequently increase their severity. Some of these consist in forcible syringing, instillation of medicaments of an irritating character, comprising almost every conceivable domestic or trade-marked nostrum.

[1]The causative agents, as over-work, crowding, sea-bathing, etc., of course apply more particularly to the inhabitants of large maritime cities like New York.

Unfavorable results are likewise often due to the application of blisters, mustard plasters, croton oil, etc., and to the bite of leeches, steaming and poulticing the organ. Temporizing incisions into the integument of the canal or periauricular region are likewise harmful, as well as the ill-judged scraping and wounding of the osseous substance when exposed.

Symptoms and Course.—Infants, who are specially subject to reflex and vaso-motor ear disturbances during dentition, head catarrh and gastric derangements, give fewer pathognomonic indications than older persons. A discharge from the ear, even with periauricular swelling, often takes place without any observable premonitory symptoms, and quite often spontaneous recovery follows so promptly that an incrustation of muco-pus in the concha of the affected ear, or a stain upon the linen, constitutes the only evidence of its occurrence.

Infants are, of course, unable to make known in an intelligible manner the distress experienced from deafness and autophonia, and the consequent fretfulness may be attributed to teething or other causes; it may often be inferred, however, that suffering from these phenomena or from pain is experienced when the child cries and puts the hand significantly up to the ear. The exhaustion resulting from worry and pain is sometimes very great and may divert attention from the actual seat of disease to the brain itself, which, indeed, in these cases is only too liable to become affected by extension of the aural trouble.

In older persons inflammation of the atrium of the tympanum is usually a painful affection, the subjective phenomena contributing to the distress, though the extent of these depends on the sensitiveness of the patient—very grave trouble not infrequently escaping detection from absence of suffering. *Rupture of the membrana vibrans* as a result of disintegration, or the pressure of se-

cretions, or from both causes combined, may take place in a few hours or after several days—pain becoming less or ceasing altogether. The subjective symptoms, however, do not disappear with the subsidence of pain; they may even become more unendurable.

Acute Catarrhal Inflammation in many instances does not go on to perforation of the drumhead, although suppuration may take place, and as regards pain, deafness, autophonia, etc., does not differ from that just described.

There is a natural tendency in these inflammatory processes to spontaneous recovery in healthy subjects; but when kindled into undue activity by meddlesome treatment or when occurring in cachectic, neuropathic or broken down persons their course is quite different; the entire middle ear tract often becomes involved as well as the periostial envelope of the outer surface of the temporal bone.

The Progress of Severe or Aggravated Cases.

Pain is generally distressing in the extreme. This, however, is by no means always a reliable symptom, since its manifestation depends on the physical susceptibility of the individual; the fortitude and apathy of both children and adults often being in this regard quite remarkable, and unless duly taken into account may lead us to underrate the gravity of the case. Sensitive and neuropathic persons, on the contrary, suffer greatly from comparatively slight causes. Intense pain may accompany either internal or external periostial inflammation, and when these coexist the suffering is no less than in pachymeningitis from which differentiation is difficult if not impossible.

Appearances of the Drumhead.—If the atrium and membrana vibrans be the principal seat of inflammation the latter is generally red and more or less bulging, and in severe cases necrosis of the dermic layer often ensues, presenting a dead ash-like hue; sometimes it is purplish and its surface rugous. But whilst the membrana vibrans may not be greatly affected, or even perforated, nor yet any swelling or tenderness about the periauricular region exist, very great pain may be experienced and we shall probably find on careful examination of the parts under good illumination that the principal seat of the disease is in the attic, and that the membrana flaccida and adjacent walls of the canal are reddened and the mallear plexus of blood vessels much more engorged than when the atrium alone is affected. In these cases we are likely to have a

Dissecting Tympano-Mastoid Abscess.

In acute inflammation of the attic, unless a regressive course is established, the secretions are liable to become imprisoned by closure of the outlets; this, together with the extension of periostial inflammation outwardly along the roof of the adjacent canal, is attended by infiltration or suppuration; the integument becomes red and tumified, and in the more severe cases detachment of the membrana flaccida and adjacent integument takes place from the tympanic ring and auditory plate. The secretions now seek an outlet from the attic in this direction, distending the tumor more and more. There is not the tendency to rupture of the sac thus formed as when the lower portion of the drumhead is distended, since the former is not only much thicker, but being more loosely attached permits secretions to easily burrow underneath. The liberated secretions now dissect their way out, first along the osseous walls of the canal and then along over the tem-

poral bone in various directions, most frequently, however, posteriorly. Sometimes along with this spreading periostitis externa, the subcutaneous connective tissue breaks down formed, limited only by the temporal fascia; in other in-extensively and an enormous periauricular abscess is stances again the abscess is limited to the region of the membrana flaccida or to the mastoid process. These dissecting abscesses in my own experience are most frequent in young children, as would be expected when the loose attachment of the drumhead to the auditory plate at this age is considered. At this age the canal and periauricular region sometimes swell up rapidly and subside again as quickly, without abscess formation. In the adult where rhinitis sicca precedes the aural trouble, the mucous membrane of the middle ear tract takes on similar action, the retained secretions being extremely fetid. There is a tendency to chronicity in these cases without much pain.

In some cases of dissecting tympano-mastoid abscess the larger vessels of the mallear plexus, as it would seem, are ruptured, and a sanguineous cyst is formed by separation of the dermic layer of the drumhead and adjacent walls of the canal. These tumors vary in size from a small bleb to that of a sac entirely filling the external auditory canal and preventing any inspection of deeper parts.

Sometimes after evacuation of the tumor the walls of the canal collapse in consequence of a separation from the upper portion of the tympanic ring. In young children, owing to the greater flaccidity of the parts, detachment of the entire membranous wall from the tympanic ring may take place, as shown by the laxity of the canal and gurgling of secretions at its inner end on traction upon the auricle. In these cases there is usually caries of the tympanic walls subsequently and ulceration of the canal.

With periostitis externa there is usually more or less asymmetrical prominence of the auricle on the affected side.

These dissecting tympano-mastoid abscesses usually, but not invariably, burrow along the superior posterior wall of the external auditory canal; not unfrequently, however, they follow the superior anterior wall. In the first named purulent matter is generally found to finally make its appearance over the mastoid process; in the latter it points above or in front of the auricle. Sometimes the entire periauricular region is involved, and in the more severe cases matter extends from the mastoid region posteriorly beneath the deep fascia of the neck as far as the median line of the occiput and even beyond—or downwards beneath the sterno-mastoid muscle and along the fascial layers underneath the trachea.

The Pointing of a Tympano-Mastoid Abscess may take place on the superior or posterior wall of the external auditory canal near the tympanum or anywhere in the periauricular region, especially over the mastoid process. They may point in the canal, however, at the same time that bulging occurs at some point about the auricle.

The occurrence of inflammation of the temporo-maxillary articulation is frequent, in the acute stage causing pain in mastication or moving the jaw in swallowing, etc., and in the chronic form, which is rare, limiting movements of the jaw.

In the progress of purulent inflammation of the middle ear tract, drainage may follow one of two routes. It may escape from the tympanum along the tract of a tympano-mastoid abscess and find an outlet either into the external auditory canal, over the mastoid process, or anywhere in the periauricular region; or it may escape by passing into the mastoid antrum, thence through the cellules and on out through a sinus in the cortex. Sooner or later the opening in the drumhead assumes, in many instances, a *teat-like form*, especially if the orifice be in the membrana flaccida. This process marks the beginning of a dis-

tinctly favorable change in the course of the disease, and in healthy subjects recovery is from this time on usually rapid. It often happens, however, especially in run-down subjects, that some or all of these outlets become prematurely closed, or blocked up by exuberant granulation tissue, polypi or escaping sequestra, so as to confine the products of inflammation, thus causing an exacerbation of the symptoms. Under these conditions an INTERMITTENT DISCHARGE is established, one outlet breaking open soon after the other closes up. When the retained secretions are increased by the appearance of a head catarrh, these exacerbations are much more severe. If no operative procedures are undertaken for the relief of symptoms due to pent up secretions, and thus giving free vent to them through the tympanum, or at the site of a closed sinus, sooner or later spontaneous rupture of one of the obstructed outlets affords relief. These cases, if neglected, may be protracted for weeks or months, their course being characterized by alternate "gathering and breaking".

Discharge from the tympanum not infrequently finds an outlet at some point near the drumhead where a dissecting abscess has opened on the posterior wall of the external auditory canal; the teat-like form of such openings is not so well marked as those above described. These sinuses are liable to be confounded with those which furnish an outlet from the mastoid cellules in this locality, but the latter are usually associated with fungosities and caries of the bone.

The favorable progress of cases possessing a good constitution and the difficult management of broken down subjects may be contrasted in the examples given under treatment on another page.

Periostitis externa may develop as described without the mucous tract of the ear being seriously involved; even the periosteum of the mastoid cortex may be intensely

inflamed without implication of the mastoid cellules. In by far the greater number of instances, however, the middle ear tract is at the same time affected.

Of the more simple cases where inflammation does not extend beyond the atrium of the tympanum, but little need be said here, since in the greater number of these the submucous structures are not seriously involved, and unless the patient's condition is unfavorable, or improper treatment has been the means of aggravating the case, their management presents no difficulties.

Inflammation of the attic of the tympanum, whether direct or by extension from the atrium, may, when the outlets therefrom remain free, pursue a favorable course without extending further; but most frequently, however, the trouble extends not only outwardly as already described, but owing to the swelling that takes place the outlets into the Eustachian tube and atrium become obstructed and pent up secretions greatly aggravate the case. The mastoid antrum and cellules become involved, and pain is, for the most part, severe. The appearance of the drumhead to the inexperienced observer often gives but an inadequate idea of the gravity of the case, yet in the more severe cases some breaking down of the membrana vibrans occurs, several perforations frequently resulting. In children this membrane may be destroyed entirely, the ossicles escaping, the walls of the tympanum becoming carious and necrotic, while the cochlea, semi-circular and facial canals become sequestrated. Facial paralysis, great loss of hearing, and vertiginous phenomena are not uncommon symptoms; as in periostitis externa, unhealthy subjects are most obnoxious to the disease.

The region affected in periostitis interna is a much more important one than that invaded during the progress of periostitis externa. Thus the extensive mucous tract of the middle ear constitutes a large inter-osseous cavern

separated from the dura mater by a thin plate of bone only. Between the walls of this cavity and the brain numerous nerves, blood-vessels and lymphatics anastomose, by means of which the suppurative process may readily pass from one region to the other. It is probable that death occurs in infancy from suppurative phlebitis or pachymeningitis consequent on inflammation of the ear much oftener than is suspected, even when caries of the bone or pent up secretions could not be detected. The frequency of the presence of thickened dura mater over the tegmen on post mortem is notable, and doubtless many obscure cases of deaf-mutism owe their origin to unsuspected injury of the auditory nerve, in this manner.

The Subjective Symptoms.—There always is some deafness and autophonia in purulent inflammation of the tympanum; when the attic alone is affected there is less than when the atrium is the principal seat of the trouble, since there is usually less interference with excursive movements of the membrana vibrans. Any inflammation of the drum is liable to give rise to abnormal transmission of sound, which if heard loudly is yet wanting in distinctness. If great tension of the transmitting mechanism exists, low tones are heard as high ones, and the rumbling of loaded trucks or horse cars gives rise to painful sensations.

These phenomena pertain to derangements of the middle ear, and do not resemble disturbances of the physiological function of the auditory nerve. When the nerve is impaired by extension of inflammation to its terminal filaments from the middle ear, or by meningitis, there is diminished perception of sound impressions, whilst disturbances (central) at its origin in lepto-meningitis give rise to dysacousma or cerebral hyper-æsthesis (painful hearing) and vertiginous phenomena.

The Occurrence of Severe or Grave Symptoms in the Course of Purulent Inflammation of the Middle Ear Tract.

Usually this is characterized by extension of periostial inflammation, internally and externally. The nutrition of the mastoidea is thus often interfered with within and without at the same time; but from whichever side of the thin osseous cortex caries begins perforation not infrequently follows and a sinus is left connecting the cellules with the external auditory canal or the outer surface of the mastoid process. Extensive swelling of the periauricular region and asymmetrical prominence of the auricle, so frequently seen, are, however, by no means to be regarded as pathognomonic of deep seated trouble, since they often exist when the mucous tract is but little affected. On the other hand, periostitis interna with so-called brain symptoms, as vertigo, headache and cerebral pain (and even delirium), nausea and vomiting, dysacousma, etc., often occur without any lesion of cerebral structures. Differentiation is difficult when these two different processes co-exist, the pains of one not being readily distinguishable from the other, but whilst one of them may, at the beginning, advance more rapidly than the other, in many instances they become, by means of an inter-communicating sinus, practically merged.

The gravity of these cases does not depend so much on the liability to transmission of the purulent process to the brain as on the local and constitutional symptoms arising in neuropathic or cachectic persons, especially when subjected to meddlesome treatment. The pernicious effects of over-treatment are seen in a large number of difficult cases, of which the following is an example: A male, 45 years of age, was suffering from an acute purulent inflammation of the middle ear tract. Severe neuralgic pains were experienced, but there was free drainage. In consequence of the copious syringing and instillation of an-

tiseptic and astringent solutions for the relief (?) of symptoms the discharge was promptly suppressed, and the aggravation was so great that periostitis of the external auditory canal and mastoid process developed. Fluctuation over the mastoid was detected before the drainage was again fully reëstablished from the tympanum. When first seen by the writer there was intermittent fluctuation; the opening in the drumhead afforded escape for the purulent matter for a day or two, when, on closing, fluctuation would again appear over the mastoid. This alternate collection and escape of matter from the drum was relieved by free incisions through the drumhead and over the mastoid, but in the meantime perforation of the cortex of the mastoid process had taken place.

Whether occurring in otherwise healthy or in unfavorable subjects there is usually a history of this kind or of exacerbation from exposure.

In children the course of purulent inflammation is somewhat different, since the mastoid cellules are wanting, though the antrum is fully developed. Defects in the tegmen are not uncommon and meningitis and cerebral abscess probably occur more frequently than subsequently. Between the second and eighth year detachment of the inner end of the canal from destructive inflammation and caries of the tympanum is often associated with Ulceration of the Floor of the Cartilaginous Canal. The drum is usually filled with granulation tissue, the canal walls thickened, collapsed and boggy, so that the lumen is almost obliterated. The retained purulent matter undergoes decomposition, especially during hot weather, and has a characteristically fetid odor. This unmanageable complication is unfavorably influenced by the intractable head catarrh with which it is often associated. In some instances, however, reflex disturbance is propagated from the diseased canal to the lungs; a striking example of this

was seen in a child brought to the New York Eye and Ear Infirmary while suffering from chronic bronchitis attendant on whooping cough—such severe spasms of coughing were excited on dressing the ulcerated surface of the external auditory canal that treatment for the time had to be suspended. In several such cases improvement in the ear was followed by relief of the cough.

In severe cases (whether so at the beginning or by subsequent aggravation) inflammation of the periostial lining of the tympanum often extends by continuity of tissue very rapidly, both internally and externally. The exacerbation may or may not be ushered in with chill, but there is usually elevation of temperature and frequency of pulse. Milder forms of aggravation manifest themselves where a long established drain through a sinus in the drumhead is obstructed by concurrent head catarrh—recurrences of which give rise to the phenomena of "gathering and breaking", as it is popularly called. Some of the more severe exacerbations are ushered in in this manner. Facial Palsy sometimes occurs during the progress of severe cases, since the inner wall of the tympanum through which the facial canal passes often becomes carious and necrotic, with consequent injury of the nerve. The resulting neuritis may be either an ascending or descending one, the latter often giving rise to intense pains in the mastoidea and neighboring parts contiguous to the course of the nerve. Facial paralysis is sometimes due to intra-tympanic pressure caused by polypi or pent up secretions; in two cases of the latter coming under my notice, the symptoms disappeared after evacuation of the fluids, in one instance through the drumhead and in the other through the sac of a tympano-mastoid abscess. In another case due to impaction of an inflamed polypus in a broken down subject suffering from an exacerbation of chronic purulent inflammation occasioned by exposure, the audi-

tory plate became carious, the cochlea was exfoliated and came away in a sequestrum. After this, recovery was rapid and considerable hearing remained for musical tones and conversation.

The following cases where grave symptoms occurred are instructive and illustrate certain phenomena better than a general description:

CASE I.—W. T., aged 18 years, came to the New York Eye and Ear Infirmary June 8, 1877, on account of an exacerbation of a chronic purulent inflammation of the right ear which had existed since an attack of measles 6 years previously. He was examined and treated for the severe pain in the ear, but did not return. His mother, however, came a few days later to inform me that he had died on the second day after his visit of "acute cerebral meningitis". The physicians in attendance were unaware of the existence of any aural complication.

CASE II.—Periostitis externa and interna, the result of an acute exacerbation of a chronic purulent process, resulted quickly in a perforation of the cortex of the mastoid and relief of the symptoms—sequestration having occurred through the sinus outwardly. Dermic transformation took place throughout the pathological tract of the middle ear.

CASE III.—Was similar to the above, but drainage was established through the sac of a temporo-mastoid abscess opening into the posterior wall of the external auditory canal, giving exit also to an osseous exfoliation. [In this case denudation of the periosteum was detected by the probe, which could be passed backward and downward along the course of purulent tract from the opening in the canal to the apex of the mastoid process. The burrowing

of the purulent accumulation coming from the tympanum and extending outwardly beneath the integument of the canal was not arrested in its progress until a point below this on the neck was reached. The accumulation present in this case might have been attributed to a discharge through a perforation in the apex of the mastoid process, had not the examination determined its source in the tympanum.]

CASE IV.—ACUTE PURULENT INFLAMMATION OF THE MIDDLE EAR TRACT. SEVERE PERIOSTITIS EXTERNA; MENINGITIS; DEATH. The patient was a lady, 43 years of age, of a decidedly neuropathic condition. She had uterine disturbance for which she had long been treated; was the subject of chronic rhinitis and there was much irritation about the head, in part attributable to very bad teeth.

Two months ago, on account of a furuncle of the right external auditory canal, Dr. R. A. Reeve, of Toronto, Canada, was called in and advised the employment of a weak solution of carbolic acid, but by mistake the strong acid was instilled into the ear. This gave rise to acute purulent inflammation of the tympanum which extended itself both outwardly and inwardly. The canal and mastoid became much inflamed and swollen. When I saw the patient in consultation, there had been incisions made on the floor and posterior wall of the canal followed by aggravation, the mastoid had been incised and three attempts made to relieve the patient by opening a passage into the cellules with the trephine. The suffering of the patient, notwithstanding the unremitting and intelligent assistance of Dr. Reeve, kept on increasing, and she was rapidly breaking down.

Examination.—Patient propped up in bed. Intelligence good and quite able to control herself for several minutes

at a time, and even conversing cheerfully, although the intense suffering caused almost constant moaning when not under the influence of anodynes. Temp. was 104, pulse 76, regular but feeble. The right external auditory canal red, swollen and nearly closed. Little, if any, purulent discharge. The drumhead almost indistinguishable from the surrounding parts. The mastoid process was enormously swollen; a large gaping purplish wound extended down to the bone where the trephining had been done. The incision was rather over the apex than on a line with the external auditory canal. The wound contained a large oakum tent firmly imbedded in the deep tissues; it had remained in this situation for the past 24 hours and was believed to reach beneath the periosteum. It came away only after hard traction. No pus was escaping from any of the openings. The pupils responded to light. There was no facial palsy, and movements of the tongue and palate were normal. Anodynes had been freely used, and the ear had been leeched. The danger seemed to lie rather in the nervous exhaustion than from invasion of the mastoid cellules.

The neuralgic pains, the severity of the periostial inflammation in and about the ear and the shock of the operations in a run-down and neuropathic subject, were sufficient to warrant an unfavorable prognosis. The patient died 24 hours after my visit of meningeal inflammation.

In contrast with the foregoing, the progress of a case occurring in an athlete of good constitution may be cited:

Case V.—Patient contracted an acute inflammation of the tympanic attic, accompanied with intense pain, in consequence of taking a Russian bath. Excessive zeal in treatment converted a simple case into a grave one before he came to the Infirmary, and when first examined it was found that a dissecting tympano-mastoid abscess had

developed. A bulging, fluctuating tumor presented on the posterior wall of the external auditory canal. A free incision established free drainage. Soon afterwards, the perforation in the membrana flaccida re-opening, the discharge began to escape readily through the tympanum. This opening now quickly assumed a nipple-like form as a markedly favorable change occurred; the sinus on the posterior wall of the canal closed, and an active regressive course was soon followed by complete cure. The intense pain accompanying the periostitis externa in this case, with want of drainage, afforded an indication laid down by some writers for trephining the mastoid process.

The unfavorable progress of another severe case, owing to the patient's run-down condition, is seen in the following:

Case VI.—Mrs. B. came to the Infirmary suffering from the results of four miscarriages and the exsanguination from hemorrhage following a recent abortion. There was a dissecting tympano-mastoid abscess and difficult drainage consecutive to acute purulent inflammation of the middle ear tract. Caries of the auditory plate and posterior wall of the external auditory canal with protruding fungosities from a sinus in the latter had taken place. Notwithstanding repeated and free incisions into the sac, and removal of the presenting fungosities, the disease assumed a chronic form and cure was much protracted.

In another instance the unfavorable symptoms were still more marked:

Case VII.—Male, aged 24 years. Had chronic purulent inflammation of the middle ear. Patient was a drunkard and suffered from tubercular deposits in the lungs. He had been using a nasal douche for the relief of ozena and this was believed to have caused the acute exacerbation of

the purulent process in the ear for which he came for treatment. On examination, it was found that the membrana flaccida was detached and that a dissecting abscess extended from the attic of the tympanum to the mastoid process, which was swollen. Discharge from the canal had ceased. There was pyrexia and accelerated pulse—124 beats per minute. The patient refused to have the attic opened by an operation, but relief occurred shortly afterwards by a spontaneous rupture of the membrana flaccida. The patient continuing his dissipated habits disappeared when thus temporarily relieved. I afterwards learned from the family physician, Dr. E. Darwin Hudson, that he died nine months after this with symptoms of pneumonia complicated by alcoholism.

Case VIII.—A female, aged 30, came for the relief of acute purulent inflammation of the middle ear tract. There was constipation, slow pulse, nausea and vomiting; deep seated pain in the mastoid, occiput and vertex. She was broken down and living under very bad hygienic conditions.

Examination showed extensive detachment and bulging of the flaccid membrane and adjacent walls of the canal. The pent up secretions caused great tension of the parts and gave rise to the above symptoms. The purulent matter was liberated at the seat of bulging, securing ample drainage and relief; as the discharge lessened a teat-like formation appeared and a cure followed in two months.

Diagnosis. — The presence of pachymeningitis and cerebral abscess is exceedingly difficult of diagnosis when occurring in connection with inflammation of the ear. Deep-seated intense pain in the head, for a time continuous and then, perhaps, intermittent for a day or more, and always increased on bending the head forward, may in the absence of severe symptoms in the ear itself, or about

the mastoidea, be regarded as pathognomonic. Yet the fact remains that the pains of aural inflammation, if present, cannot always be differentiated from the above. Severe headache, vertigo, staggering, vaso-motor disturbances, as flushing, bilateral or unilateral sweating about the head, etc., are familiar symptoms in severe aural disease where a favorable result may be confidently expected. Prodromic symptoms by means of which the fatal termination of any particular case can be foretold are wanting. We are thus unable to distinguish the pain of meningeal irritation and neuralgic headache from the pains of periostial inflammation of the ear.

A case of lepto-meningitis occurring in the writer's experience, in acute purulent inflammation of the middle ear tract, in a run-down female subject with marked neuropathic symptoms, occasioned apprehensions of the existence of pachymeningitis, and an eminent consultant, Dr. James R. Leaming, was inclined to the opinion that the symptoms pointed to tubercular meningitis. Recovery, however, took place and a review of the case seemed to justify the diagnosis of lepto-meningitis.

When the more pronounced and recognizable symptoms of pachymeningitis and cerebral abscess manifest themselves, as convulsions, paralysis of some of the cranial nerves, coma or semi-coma, etc., the case has already passed beyond relief by surgical treatment directed to the ear.

Threatened brain trouble, so-called, is too uncertain a condition upon which to base a precautionary operation of the gravity of opening up the cellules of the mastoid through its cortex.

The aid of the ophthalmoscope has been invoked in determining the occurrence of optic neuritis or choked (congested) disk in connection with pachymeningitis due to ear disease, but this condition when recognized

can, it would seem, but add another symptom to others sufficiently convincing.

The intermittent pains accompanying intermittent mastoid abscess are often severe enough to give rise to apprehensions and are considered by some authorities as an indication for trephining the mastoid; in my own experience they have not been found significant of danger.

It would seem that the pains attending a descending neuritis of the facial nerve in its passage through the mastoid might be misleading; I have seen cases of this kind accompanying acute catarrhal inflammation of the drum of the ear where the cellules of the mastoid were apparently not involved.

The appearance of the external auditory canal affords valuable evidence of the nature of the disease even when the drumhead cannot be seen. Thus, when the track of a tympano-mastoid abscess is manifested upon the posterior or superior wall of the external auditory canal by a bulging, purplish sac, it may be mistaken for a polypoid growth, and when fungosities make their appearance after the sac ruptures or has been opened the resemblance is, indeed, misleading. Fungosities, however, are seldom abundant unless the inner wall of the canal is carious.

A dissecting abscess may reach the meatus externus, resembling the swelling caused by furuncular or diffuse inflammation, either of which may close the lumen.

Inflammation of the subcutaneous tissue or erysipelas sometimes extends into the external auditory canal from without, but does not usually give rise to periostitis externa; when occurring along with inflammation of the middle ear tract the diagnosis is not always easy.

The following cases are believed to be instructive in connection with the question of diagnosis:

CASE IX.—ACUTE PURULENT INFLAMMATION OF THE TYMPANIC ATTIC AND MASTOID ANTRUM CAUSED BY THE USE OF THE NASAL DOUCHE FOR THE RELIEF OF RHINITIS SICCA. PACHYMENINGITIS. CEREBRAL CONGESTION. DEATH.

The patient was a man, 38 years of age, employed as a railroad clerk. He was a strong looking person who had led a rather exposed outdoor life. He had been recommended to go to the New York Eye and Ear Infirmary by Dr. Robert F. Weir on Oct. 9, 1882, from his clinic at the College of Physicians and Surgeons, for indoor treatment.

For the relief of long standing suppurative rhinitis he has occasionally employed the nasal douche, using a solution of salt in warm water. This practice has been followed a number of times by pain in both ears. Five weeks ago, after using the douche he immediately experienced pain in the right ear, which lasted all day, and a few mornings later he was awakened by its severity. From this time on the pains were severe, and in a few days a muco-sanguinolent discharge appeared, soon succeeded by a copious flow of muco-purulent matter. Although suffering greatly, for three weeks he kept on at his outdoor work, hoping that the ear would get well without treatment, but, the pain becoming unbearable, finally he consulted Dr. L. M. Osmun of Phillipsburg, N. J., the family physician. He was advised to remain indoors and given morphine freely, but the pains increased. The hypodermic use of morphine was now resorted to and during the two weeks he remained under treatment at home the ear was constantly poulticed and syringed three or four times a day with carbolic solution, three drops of the acid to the ounce of water. The physician and his friends, being convinced that he was daily getting worse, decided to bring him to New York.

Examination.—The patient was evidently fatigued by the journey of 75 miles on the rails. He had the appearance of having suffered greatly; was anxious and depressed. Usually of a ruddy complexion, his face was now pale and the malar eminences flushed. The eyes were dull. The skin was humid, and he was closely wrapped in heavy clothing, though the day was not cold. He said he felt completely worn out from loss of sleep and the intense suffering he had experienced for five weeks. From being courageous he had become exceeding neuropathic and timid, and was specially nervous when his ear was examined. Laryngoscopic examination confirmed the existence of ozena. The teeth and gums were healthy. The appearance of the left drumhead showed that chronic catarrhal inflammation has long been present.

The right (affected) ear on examination showed the following: The external auditory canal was large; its inner end was red and considerably swollen; near the drumhead was a collection of dark greenish, thick pus. (This dark greenish purulent matter I have found frequently present in the ear of subjects of ozena—the suppurative action in the middle ear tract resembling that in the naso-pharynx.) The drumhead was red, the membrana flaccida fleshy looking and bulging. In front of the short process of the malleus is a mass of pouting granulation tissue, filling a perforation, in the centre of which is a small pulsating light reflex. There is intense hemi-crania on the affected side—localized points of tenderness over the temple and nape of neck. The mastoid process is not red or swollen, nor tender to the touch. *Hearing:* ordinary voice in the right ear.

The attic membrane cleared up under treatment; the membrana vibrans, at no time after being seen much affected, was incised freely and the atrium was found almost normal—a little mucus only escaping. Valsalvan ex-

periments showed that the passage from the throat to the drum was free throughout. The perforation in the membrana flaccida healed on cessation of the discharge, and the patient steadily improved, but up to the time of his departure for home the hemi-crania continued off and on. The subsequent history and report of post mortem, obtained from his physician, was to the effect that after his return on November the first, the periodical attacks of frontal and vertex pain became more frequent and severe, without any discharge from the ear, and, coma supervening, the patient died on Nov. 15th. Upon post mortem examination the meninges and veins of cortex were found to be markedly congested. The temporal bone was not examined. The examination of the case at the Infirmary left the impression that the severe remittent pains might be neuralgic, since they had continued so long with intervals of marked improvement. Were the pains those of pachymeningitis, however, this symptom indicated its presence from the outset, and, therefore, drainage having been good during the progress of the case, an operation on the ear would have been of no avail.

Case X.—Chronic Purulent Inflammation of the Tympanic Attic and the Mastoid Antrum. Exacerbation from Impaction of Polypus. Facial Palsy. Pachymeningitis. Death.

J. G., a merchant, aged 46 years, was first visited at his residence on June 3, 1879. Patient gave a neuropathic ("malarial") history and was suffering from nervous exhaustion due to the strain attendant on a series of unsuccessful business ventures during the past nine years. He has had a discharge from the left ear since childhood, and when living in England was taken by his father to London to see Mr. Toynbee. Of late years a "fleshy" growth presenting at the left meatus has been noticed. He

stated that four weeks ago the discharge ceased and he was taken with severe pain in the ear extending to the mastoid process and side of neck and face. About ten days ago all of the symptoms increased in severity, and the left side of the face became paralyzed. Leeches and poultices were applied without giving any relief. During the past two days the escape of pus and blood from the pharynx seemed to point to drainage through the Eustachian tube.

Examination.—The inner extremity of the external auditory canal is completely occluded by an impacted polypoid mass. There is left facial paralysis. There are a number of carious teeth in the lower jaw, together with a heavy collection of tartar. He complains of photophobia and vertiginous phenomena; the pulse and temperature are almost normal.

Treatment.—The polypus was removed with a snare, and the patient was placed under appropriate constitutional treatment. During the next month there was, however, no improvement in the symptoms, the patient continuing to run down, although the drainage from the ear was unobstructed. There were at times severe exacerbations of pain in the head and ear with vertigo and vomiting. After the 27th day the patient grew rapidly worse, agonizing pain in the head and vertigo were constant, diplopia and muscular spasms of right side of face appeared: he was unable to swallow or voluntarily empty the bladder—became comatose and died July 11th. In this case, after the cerebral symptoms set in, and after establishment of free drainage, there was no further increase of the inflammation of the middle ear tract, nor was there any periostitis externa.

Pathology.—Purulent inflammation of the middle ear tract, consecutive to the exanthemata or catarrhal inflammation of the upper air tract, often terminates in great

destruction of the parts; the drumhead and ossicles are all of them sometimes missing and on looking into the ear a large cavern embracing the tympanum, mastoid antrum and some of the cellules, is seen. This pathological cavity in certain cases opens by a larger or smaller canal on the mastoid cortex behind the auricle; it is usually lined, after cure, by a white polished surface of uncovered bone or cicatricial tissue. When the inner tympanic wall gives way to caries and necrosis the labyrinth is also included in these caverns which usually contain more or less desquamative material, cerumen and other débris. Occasionally the margin of the auditory plate, forming the upper portion of the tympanic ring, is also missing, and more rarely in children the entire auditory plate is detached. When to this is added the destruction of a portion of the tympanic process, the deformity is much increased.

When fragments of the drumhead remain and become attached to the inner wall of the tympanum, or inverted and thickened, as usually happens when the membrana flaccida, portions of the hammer and anvil and mucous lining alone remain, drainage is much interfered with. In some instances a pouch-like receptacle for secretions is thus formed.

Owing to the violence of the disease in infants and other unfavorable subjects, drainage is often incommensurate with the outpour from the mucous tract—or adequate outlets become prematurely obstructed or closed entirely. It is in these cases that severe symptoms develop; periostial inflammation, both internal and external, with tympano-mastoid abscess and caries of the bone, transforming a simple case into a grave one.

External periostial inflammation is very often attended with extensive suppuration and abscess in the subcutaneous connective tissue, and the denudation of bone and caries of the mastoidea. Especially when at the same time

internal periostial inflammation extends deeply into the mastoid cellules, perforation of the cortex takes place either through the posterior wall of the external auditory canal or through the cortex of the process behind the auricle.

FUNGOSITIES at these outlets, particularly at the former, springing up from the carious cellules, are usually present and sometimes redundant.

Exfoliation of Sequestra.—During the continuance of inflammation of the mastoid cellules the granulation tissue which fills them and any sinuses leading to the cortex of the mastoid process, into the external auditory canal or into the tympanum, *envelopes and absorbs minute sequestra.* This will not take place while they are immersed in pus only. Small sequestra carried out along with secretions are doubtlessly sometimes reported as being the ear ossicles.

In the 131 more grave cases observed by me of which notes were taken, exfoliation occurred with about equal frequency through the mastoid process and external auditory canal. Of these 131 cases 25 per cent. had periostitis externa with abscess over the mastoid process; 23 per cent. had tympano-mastoid abscess; 16 per cent. had perforative necrosis of the cortex of the mastoid process; 21 per cent. had caries of the tympanic walls; 14 per cent. had facial paralysis; 24 per cent. had polypoid tumors.

It has been stated by writers that in some instances the purulent process of the middle ear tract is limited to the mastoid antrum and cellules, fatal cases of which have been reported. It seems probable to the writer that such cases must be extremely rare, or that they were instances of early closure of drumhead perforation where drainage continued to be carried on through the Eustachian tube.

The discussion here of phlebitis, thrombosis, pyæmia,

metastatic abscesses, pachymeningitis, and cerebral abscess, would carry me too far, besides the subject has been fully discussed in numerous valuable papers which are accessible.

The results of inflammation of the mastoid cellules are either induration or atrophy of the osseous structure. Since the rudimentary cellules of the mastoid in children are, when inflamed, liable to become obliterated, the parts in later years may present dense bony structure instead of cellules.

The temporal bone, like other bones of the skull, is supplied with nutrient vessels both from its outer and its inner surfaces (the dura mater and periosteum). The middle ear tract is inserted between these surfaces, and has a mucous-periostial lining of its own. This large space within the bone, divided into larger and smaller cellules, is surrounded for the most part by a very thin shell of bone. There are thus four surfaces, each with its own arterial supply; and this supply is sufficient so that when the periosteum (or corresponding endosteum) is destroyed on one side no necrosis or caries usually results therefrom. Thus either the external periosteum, and the outer layer of the duramater (which is the internal periosteum), or the mucous-periostial membrane, or exosteum, lining the entire middle ear tract, may be destroyed without materially affecting the nutrition of the bone. In consequence of this provision it is found after a cure has been effected in purulent inflammation of the middle ear tract, with destruction of the mucous membrane, that a glistening, white, healthy, though denuded, surface of bone remains. Inflammation of both internal and external mastoid surfaces is, probably, usually necessary for the complete destruction of the cortical layer.

The Prognosis of purulent inflammation of the middle ear tract where a non-meddlesome plan of treatment has

been adopted from the beginning is favorable, both as regards life and preservation of hearing. In over twenty thousand cases of ear disease coming under my own observation during a period of seventeen years of special practice, of those seen at the beginning no fatal case has occurred; of the cases seen after severe symptoms had developed twelve cases have died—some of them so long after the aural trouble had abated that its influence as a factor could almost exclude them.

In very young children it seems probable that the acute purulent process is much more likely to set up meningitis than in older persons, and although statistics are wanting to establish the prognosis among this class, a grave or fatal issue is probably much more frequent than is suspected.

Treatment.—In the treatment of uncomplicated acute inflammation of the tympanum it is well to prevent meddlesome interference and enjoin as complete rest as possible for the first few days. If there is free secretion of serosanguinolent or muco-purulent matter with obstruction of the Eustachian tube the drumhead usually is ruptured spontaneously, but if found distended with advancing rather than receding inflammation it is good practice to incise and give vent to secretions. This should be more promptly done if the drumhead be found thickened, either as a result of cicatricial transformation or recent engorgement and infiltration. Discharge having been established uninterruptedly, so far as otherwise healthy subjects are concerned, an expectant course, including diligent attention to keeping the ear clean, is advisable. Cleansing the ear may be accomplished by gentle syringing, using as little water, well warmed, as possible, and drying out with the armed cotton-wool carrier. A weak solution of boric acid answers well for syringing. When catarrh of the entire upper air tract co-exists with the aural catarrh minute doses of mer-

cury with bryonia alba have answered well in my hands; when "cricks" or "malaria" are present small doses of rhus toxicodendron or quinine may be given, and if coated tongue with gastric disturbance exist, calx sulphurata is indicated and may take the place of mercury. The pain nearly always present in some degree may be allayed by mild nervines, as dilute tincture of pulsatilla, aconite, etc. Hot emollient solutions of boric acid in cases where nasal catarrh is present may be employed by gargling or sniffing up the nose cautiously.

It does not seem good practice in the acute stage or when healing of perforations is taking place to forcibly distend the membranous portion of the drum by inflation.

Under this treatment discharge gradually ceases in the majority of cases, but it may take place suddenly, in which event a cure must not be confounded with retention of discharge from an exacerbation due to exposure or other cause. Where pain is very severe large doses of morphia should be tentatively given, with intermission of as great duration as possible, since consequent reaction leaves the patient much depressed.

The so-called dry treatment should not be commenced until discharge diminishes, and when perforations begin to close a tolerably firm incrustation of calendula and boracic acid powder may be allowed to remain as a support to the drumhead. If the regressive course proves to be sluggish the instillation of a few drops of calendula will hasten the healing process.

When the regressive course is established outdoor life and attention to business may be resumed to a degree commensurate with the age and vigor of the patient. I have frequently seen cases where it was necessary to insist on the resumption of bodily activity. In broken down subjects, supporting nutrition from the beginning is necessary.

Fig. 1. Natural size.

Severe Cases.—In complicated cases of purulent inflammation, where the entire middle ear tract and exterior parts are more or less involved, there is no more difficult disease to treat. Severe symptoms may exist from the first or an acute exacerbation of a chronic process may assume a severe form, especially in cachectic or neuropathic subjects. The exciting cause is generally exposure, neglect or mal-treatment, or all of these combined. Attention to these cases will, most likely, first be called by the pain attendant on suppression of secretions. Whether this occurs in consequence of blocking up the outlet, or outlets, by swollen mucous membrane, polypoid masses, sequestra or general periostitis and inflammation of the subcutaneous connective tissue, no time should be lost in temporizing and ineffectual surgical procedures. In these cases it will scarcely ever be found that the atrium of the tympanum alone is affected, since drainage from this region cannot so easily be arrested. It is the invasion of the tympanic attic and mastoid antrum and cellules that almost invariably gives rise to trouble of a severe character.

Directing attention first to the drumhead, if periostitis interna exist we shall probably find that accumulations in the attic have finally bulged out the integument composing the membrana flaccida, increasing its dimensions at the expense of the superior wall of the external auditory canal above and of the dermic layer of the membrana flaccida below. A free incision, carried

well down through the distended tissues of the canal to the bone and continued on along to the margin of the auditory plate and well into the membrana flaccida, should be made without delay. I have found the knife shown in figure 1, well suited to this operation; it is a finely balanced instrument; the blade and handle are forged of one piece of steel. Drainage is best secured when the incision is carried freely into the attic where one or the other of the passages, situated on either side of the handle of the malleus, affords natural drainage from the attic to the atrium. By means of timely interference the more severe symptoms may be averted. Delay in these cases, where periostial inflammation is extending itself outwardly from the tympanum, favors the development of dissecting tympano-mastoid abscess which may eventually involve the entire temporal region—limited only by the outlines of the temporal fascia. I have seen even these relieved by removal of obstructions to drainage in the tympanum without external incision. Bulging of the tissues in these cases on the posterior wall of the external auditory canal should not be mistaken for an opening from the cellules of the mastoid; when it occurs in this situation, an incision should be made even though an opening should be required in some portion of the periauricular region—and when a counter opening is thus made it is well to introduce some strands of catgut through from one to the other. Although in mild cases of periostitis externa, and inflammation of the subcutaneous connective tissue, reabsorption sometimes appears to take place, it is a safe rule to liberate purulent matter as soon as possible after its detection.

Nipple-like formations at the seat of perforations in the drumhead are liable to be mistaken for polypi, and, indeed, redundant granulation tissue is sometimes present in the opening, but its removal is seldom advisable.

In acute inflammation of the tympanic attic a cure may be brought about if the case be seen early by means of

suction applied at the faucial opening of the Eustachian tube as described by me in the *Lancet*, Oct. 18, 1884.

The following cases further illustrate the course and treatment of severe symptoms:

CASE XI.—ACUTE PURULENT INFLAMMATION OF THE ATTICUS TYMPANICUS, DEFECTIVE DRAINAGE, FORMATION OF A DISSECTING TYMPANO-MASTOID ABSCESS. CURE.

Mrs. W., aged 38 years, came to the New York Eye and Ear Infirmary April 26, 1886.

No history of previous aural disease. Six weeks ago the patient was taken with pain in the left ear, followed by a yellow discharge. Three weeks ago the running ceased, there was autophonia, and deafness and headache became very severe. At the same time a painful swelling was noticed over the mastoid process. No vertigo or nausea. Upon examination, there is found asymmetrical prominence of the left auricle, and the whole post-aural region of that side is swollen, tense and fluctuating in one spot. The posterior superior wall of the external auditory canal is so much detached and bulging, that a view of the deeper parts cannot be obtained. The meatus contains some inspissated matter. Patient hears ordinary voice in affected ear.

Treatment.—It was decided to effect drainage by an incision over the mastoid, which was accordingly made and a large quantity of purulent matter was evacuated. As was suspected, the connection between the cavity of abscess and the atticus tympanicus was detected by a careful exploration with the probe. Three days later the subjective symptoms had subsided, and the membrana flaccida and membrana vibrans could now be seen. The perforation in the former had healed and the latter was found to be unaffected. The hearing had improved to low voice. In 35 days the abscess had healed and patient was discharged cured.

CASE XII.—ACUTE PURULENT INFLAMMATION OF THE TYMPANIC ATTIC AND ATRIUM. DISSECTING TYMPANO-MASTOID ABSCESS. CARIES OF THE SUPERIOR WALL OF THE EXTERNAL AUDITORY CANAL. NEGLECT OF TREATMENT. CURED IN 30 DAYS.

Albert J., aged 29 years, came to the New York Eye and Ear Infirmary April 12, 1886. He indulges freely in the use of wine and beer; works in a damp, dark room, and is exposed to draughts of cold air while heated. Two months ago contracted a severe head catarrh with pain in the left ear, accompanied by deafness and autophonia. Local applications of sweet oil, pieces of bacon, and the like were made, and he continued to attend to his work. Two weeks ago the whole temporal and mastoid regions became swollen and painful. He noticed no aural discharge.

On examination of the left ear, the superior posterior wall of the external auditory canal was found so completely detached that a view of the deeper parts could not be obtained. There is some inspissated matter present, but no pus.

The whole left temporal and mastoid regions are uniformly swollen and tender, but no fluctuation could be obtained. Patient hears loud voice in affected ear. He has hypertrophic catarrh of the upper air tract, and the teeth are in a carious condition.

Pain was now increasing and the patient complained of vertigo.

Treatment.—An incision was made through the membrana flaccida and outward through the superior wall of the adjacent canal. This not proving sufficient to evacuate the purulent sac, more complete drainage was then secured by counter openings made in the temporal and mastoid regions, and subsequently, as the superior wall became more detached, its most dependent part was also opened. Strands of catgut were kept for a time in the

passage extending from the opening in front of the auricle to the one in the external auditory canal. On examination of the parts when thus opened up, the upper wall of the bony portion of the external auditory canal was found to be denuded and roughened—the site of the spot being marked at the opening in the canal by a mass of granulation tissue. The operations were done under ether. The patient was advised to rest, and calx sulphurata was given in small doses frequently repeated. Pain was relieved by aconite. From this time improvement was rapid. The abscess healed up, suppurative action in the tympanum ceased, the openings cicatrized, and on the thirtieth day patient was discharged cured.

CASE XIII.—ACUTE PURULENT INFLAMMATION OF TYMPANIC ATTIC AND ATRIUM, DISSECTING TYMPANO-MASTOID ABSCESS EXTENDING TO APEX OF MASTOID PROCESS, EXHAUSTION FROM WORRY AND OVERWORK. DRAINAGE ACCOMPLISHED BY NIPPLE-LIKE FORMATION, AND INCISION INTO SUPERIOR WALL OF THE EXTERNAL AUDITORY CANAL.

Ferdinand K., aged 51 years, a shoemaker, came to the New York Eye and Ear Infirmary April 19, 1886. Is in poor health, suffering from nervous exhaustion due to worry and overwork. One week ago he was taken with pain in the right ear extending to the mastoid process and down the side of the neck depriving him of rest. A mustard plaster was applied to the right mastoid process and probably served to increase the trouble. He has noticed no discharge from the ears.

Examination.—The patient is anæmic and looks worn out. The right external auditory canal is closed at the inner end by the detachment of the posterior superior wall; the parts are red and covered with inspissated matter.

Hearing.—Ordinary voice with affected ear.

There is an illy defined swelling over the apex of the right mastoid process, extending down the course of the sterno-cleido-mastoid muscle. The whole of this surface is tender. The teeth are carious and enveloped in tartar. He complains of vertigo, and sweats a great deal about the head.

Treatment. — The patient was placed under better hygienic conditions, including rest. Constitutional irritation and pain were allayed with small but frequently repeated doses of aconite, gelsemium, etc., and five drops of tr. ferri chloridi were given three times a day. Drainage was partially established through the tympanum shortly, and the consequent subsidence of the detached walls allowing a better view of the membrana flaccida, it was freely laid open. At this time pressure upon the swollen tissues of the mastoid apex produced a free flow of pus through the opening in the membrana flaccida. The formation of a nipple-like process at the site of this perforation four days later was followed by a markedly favorable change in the character of the symptoms. There was less pain and vertigo; he rested better, and the appetite improved. Notwithstanding the benefit of this efficient drainage it was subsequently thought best to make an incision in the superior wall of the canal where some tumefaction was found. This was made to extend from the tympanic ring well outwardly. The patient then made a rapid recovery; the incision and perforation quickly closed, and discharge from the attic ceased. The patient was discharged cured in 21 days. The operations were all, of course, performed under ether.

CASE XIV.—ACUTE PURULENT INFLAMMATION OF THE TYMPANIC ATTIC AND ATRIUM. OBSTRUCTION TO DRAINAGE FROM PACKING THE EXTERNAL AUDITORY CANAL WITH BORACIC ACID POWDER. EXTENSION OF INFLAMMATION TO MASTOID ANTRUM AND CELLULES. PERFORATION OF MASTOID CORTEX. CURED IN 40 DAYS.

This patient was a mechanic, 18 years of age, admitted to the New York Eye and Ear Infirmary March 19, 1886. He had had discharge from the left ear when a child. Three weeks ago he was taken with pain and autophonia in the left ear, followed by a discharge in 24 hours. The ear was syringed daily, but the continuance of the pain compelled him to apply to a city dispensary for relief. Boracic acid powder was given him with directions to introduce and pack some of it daily into the ear. These directions being faithfully carried out the pain increased in severity, accompanied by vertigo and headache, and three days ago a painful swelling appeared behind the (left) ear.

Examination of the left external auditory canal after removal of the impacted powder showed that the inferior and posterior walls were detached and bulging, the drumhead was fleshy looking and slightly distended. There was a pulsating light reflex visible near the umbo.

The tissues over the left mastoid process were swollen and tender.

The pharynx is dry and congested, and there is a foul discharge from the nose.

Hearing, ordinary voice at ten feet in the affected ear, and low voice in the right.

Patient is nervous and depressed; pulse 100, temperature 101. The patient refused to have an incision over the mastoid made and during the succeeding four days the mastoid pain and swelling steadily increased, constitutional

depression became more marked, vomiting occurred at intervals, and nourishment was refused; pulse 130-135 per minute. The mastoid abscess was then freely incised, and the cortex fully exposed. A small sinus was detected in the outer wall leading into the cellules. This was situated on a line with and two inches posterior to the inferior wall of the external auditory canal.

In six days all suppurative action in the tympanum had ceased, although the perforation just in front of the umbo remained unhealed. The post-aural sinus closed in 40 days from the date of incision, and the slight discharge from the canal then ceased also. The post-aural cicatrix was slightly depressed and adhered to the bone. The details of constitutional and local treatment are, for want of space, omitted.

Case XV.—Acute Purulent Inflammation of the Attic. Dissecting Tympano-Mastoid Abscess. Caries of the Mastoid Antrum and Cellules and Perforation of the Cortex. Cured in 49 Days.

For the notes of the following case I am indebted to Dr. Robert Barclay, formerly assistant surgeon to the New York Eye and Ear Infirmary.

The patient, a female, 30 years of age, came to the Infirmary Jan. 26, 1885.

She was pale, anæmic, very nervous and worn out with the care of a family of five children—in fact, an exceedingly neuropathic subject. A number of her teeth are in a carious condition. She has had a number of miscarriages. One and a half months ago after exposure to cold, the patient was taken with earache in the right ear, accompanied with autophonia and deafness. She applied for treatment at a dispensary, and for the relief of her symptoms blisters, syringing and morphine were employed at different times. She continued to get worse, however,

hemi-crania came on, and a discharge from the ear appeared 15 days ago. She has since been unable to get sufficient rest at night, and her appetite has failed.

On examination of the right ear the membrana flaccida is seen to be bulging, detached and fleshy looking; there is a slight quantity of purulent matter in the canal. The tissues over the mastoid process are œdematous and boggy and the surface is red. A free incision made in the membrana flaccida was followed by a copious discharge of purulent matter from the attic. Under appropriate constitutional treatment there was for a time general improvement, but upon the twelfth day the incision had partially closed, and there was increased pain, vertigo, and hemi-crania, with more marked swelling over the mastoid. The tissues over the mastoid were therefore freely incised, and a considerable quantity of pus evacuated. The bone was found denuded and roughened, and a sinus was discovered extending through the cortex to the cellules and antrum. The patient then neglected to apply for treatment for two weeks, and upon presenting herself again the post-aural incision was found to be closed. The whole mastoid region was swollen and tender. This swelling had alternately subsided and reappeared during her absence, indicating that a communication existed between the attic and post-aural abscess along the superior wall of the auditory canal, beneath the soft parts.

Upon inspection of the canal, this diagnosis was further substantiated by the bulging sac-like detachment of the posterior superior wall. An incision into this part gave vent to pus, both from the attic and post-aural region. A free incision was again made into the tissues of the mastoid, and from this time improvement was uninterrupted. The sinus through the cortex closed, the post-aural wound healed, the discharge from the canal ceased and the patient was discharged cured on the forty-ninth day.

CASE XVI.—ACUTE PURULENT INFLAMMATION OF THE ATTIC WITH PERIOSTITIS EXTERNA IN A PHTHISICAL PATIENT; RECOVERY. FOLLOWED BY A SECOND ATTACK ONE YEAR AFTERWARDS WITH TYMPANO-MASTOID ABSCESS, CARIES OF THE TYMPANUM AND MASTOID PROCESS, AND OF THE BASILAR PORTION OF THE OCCIPITAL BONE. DEATH.

M. S., aged 31 years, admitted to the wards of the New York Eye and Ear Infirmary January, 1884. No specific history. No history of previous aural disease. Is the mother of five children, and has had six miscarriages during the past four years, the last occurring five days ago. Two days after this she became affected with severe head catarrh and experienced severe pains in the left ear, extending to the side of the head. In 24 hours there was a discharge from the ear. For the past week she has had odontalgia.

Examination.—Patient is poorly nourished, the face pale and worn looking. She has long had decided chronic rhinitis; the tonsils are hypertrophied and the pharynx is the seat of adenoid vegetations.

The teeth are in an exceedingly bad condition, the gums are foul and swollen around a large number of exposed fangs.

The left external auditory canal is filled with purulent matter. The posterior portion of the membrana flaccida and adjacent wall of the canal are detached and bulging. She hears ordinary voice in the affected ear.

During the next 30 days after her admission, although suffering from severe exacerbations of hemi-crania of the left side, the condition of the ear improved, the discharge ceased, the canal became free of swelling, the drumhead healed and cleared up. The treatment consisted in rest, regulated diet and the use of aconite, gelsemium, morphia and chloral for the relief of pain, more decided doses of the latter being given for the temporary relief of par-

oxysms. Arsenic and quinine were also employed. The oral irritation was partly relieved by the removal of some of the worst teeth. Paroxysms of neuralgic pain, though less severe, remained, as well as a sense of discomfort about the head, up to the time of her discharge as an indoor patient on Feb. 27, 1884.

The patient sought relief at the Infirmary one year later and her condition was so deplorable that on the 15th of Dec., 1885, she was again admitted as an indoor patient, giving the following history: During the past year she has had cough, expectoration, at times bloody, and night sweats. Pain and discomfort (autophonia) in the head have continued to a greater or less extent.

The left ear has been discharging for the past two weeks and the paroxysms of hemi-crania have become very severe.

Examination.—The patient is much more emaciated than when last seen. The left ear and whole of left side of head is very painful and there is considerable hyperæsthesia of the parts in the left parietal and temporal regions, and along median line of vertex. The left auditory canal is filled with purulent matter, and the membrana flaccida and adjacent posterior superior walls are detached, bulging and fleshy. The Valsalvan method of inflation produces a free flow of purulent matter from the tympanum. The patient has pulmonary tuberculosis. During the next month the patient was confined to bed, there was daily febrile action, sweating, and profuse expectoration. Although the pain in the ear, temporal and frontal regions continued, no localized pain, swelling, or tenderness were present, no vertigo or vomiting. On Jan. 23, a deep seated sense of fluctuation was obtained over the apex of mastoid, and an incision was made (under ether). The apex and body of mastoid were fully exposed, but no carious bone was detected nor was any purulent accumulation found. Owing to a misunderstanding the dressings were not properly

changed as directed during the succeeding four days, but were unfortunately urged into the wound with so much energy that much irritation was caused, and, secretions not escaping, some burrowing and pocketing occurred, backward and downward beneath the occipital bone. A large sac soon formed in the sub-occipital triangle, and portions of the exposed surface of the occipital bone became carious. Feb. 4, 1886, a small sinus was detected, it was believed, in the outer wall of the cortex of the mastoid leading into the cellules. Water syringed into the post-aural wound passed freely into the external auditory canal. The drainage from the tympanum through the canal and through the sinuses was very free. From this date the patient improved steadily. She was able to take outdoor exercise and more food; the pain was less severe. The post-aural wound was closing up. It had been for some time apparent, however, that the patient would probably eventually yield to the constitutional disease which had made such advancement already, confirmatory of which was the tendency to rapid breaking down of the tissues about the ear under the inflammatory process. A case tending so strongly to chronicity and promising so little from surgical treatment was thought to be unsuited to the wards of the Infirmary and she was discharged on February 22, 1886. The case during the last attack was under the efficient care of my assistant, Dr. Bartlett. She died at Mt. Sinai Hospital on June 25, 1886, of "Pulmonary Tuberculosis, Caries of Temporal and Occipital bones, and Œdema of the Lungs". I learn from my friend Dr. Daniel M. Stimson, who had the case under observation most of the time after leaving the Infirmary, that the mastoidea and adjacent occipital bone gave way rapidly and were found to contain tubercular deposits.

The foregoing cases for the most part represent the unfavorable progress of the disease in the neuropathic and

broken down subjects in which severe symptoms are more likely to arise. The experience derived from the study of the treatment of this class of persons points to the necessity of the prompt liberation of pent up secretions.

The Question of Trephining the Mastoid Process.

It will have been observed that for the purpose of draining the middle ear tract I have favored keeping open the outlet through the tympanum into the canal rather than through the cortex of the mastoid. I cannot conceive of the necessity of this latter operation so long as favorable results follow the evacuation of purulent matter from this region through the more natural channel of the tympanum. The natural drainage that takes place from thence *via* the Eustachian tube is always more or less available, and the softness of the outer wall of the tympanum, the drumhead, affords means for a more free outlet when the former proves insufficient. The attic situated immediately above the atrium naturally drains into it and the mastoid antrum, somewhat on a higher level than the attic—indeed quite above it in infants—empties itself into this apartment.

The lower mastoid cellules, when the seat of purulent inflammation, discharge into the antrum when the passage is unobstructed, otherwise through the posterior wall of the external auditory canal or the cortex of the mastoid process. From my own observation I believe that perforative caries takes place in the former quite as often as the latter situation. In external periostitis the posterior wall of the canal is perhaps more frequently affected than the cortex of the mastoid process. Were there any indications to guide the surgeon in the detection of pent up secre-

tions in the cellules of the mastoid before a sinus had announced the fact, I should not hesitate to perforate healthy tissues in order to relieve the patient; but I am aware of no such indications.

Where the inflammatory process, either an internal or external periostitis — or both — has caused the destruction of the cortex of the mastoid the sinus should, of course, be kept open and enlarged by cutting or chiseling if necessary, remembering that the cranial fossa is only separated from the cellular structure by a more or less thin shell of bone. Special efforts need not always be made to maintain the opening after drainage through the natural channel has been established. Usually the cortical opening quickly closes spontaneously in a large number of cases so soon as drainage from the tympanum becomes efficient.

I have never been convinced of the advantage of any trephining operations which opened up only the healthy cellular structure of the mastoid process, nor of the advantages claimed by some writers to have taken place on thus carrying a canal from the cortex into the dense hypertrophied mass produced by previous inflammation of the cellules.

Trephining the Mastoid Process.—The urgency of the symptoms in certain cases, in view of a possible fatal result, has induced some authorities to recommend this operation and the following indications have been laid down for its performance by Schwartze[1]:—

"1st. Acute inflammation of the mastoid cells with retention of pus, where Wilde's incision or treatment with ice does not relieve the œdema, pain and fever.

2d. Cases in which there is intermittent swelling over the mastoid and fistulous openings in the skin or, in other words, where nature is endeavoring to effect a perforation through the bone. In these cases the operation should be performed before symptoms threatening to life set in.

[1] Recent progress in Otology, J. O. Green, Boston M. and S. J., June 26, 1879.

3d. Cases in which there is fluctuation beneath the cutis of the upper posterior wall of the meatus corresponding to the floor of the antrum, or where a fistulous opening has already formed at this spot, the operation should be performed without hesitation if brain symptoms are noticed.

4th. Distinct caries of the mastoid and tympanum and of the osseous labyrinth all indicate the operation, which should not be neglected even in the worst cases, as experience shows that even the whole labyrinth may be removed by necrosis and yet the cavity fill up with healthy granulations which gradually ossify and the otorrhœa is cured."

"The operation as a prophylactic measure, merely to relieve chronic suppuration of the tympanum, and to avoid the possible dangers of pyæmia, meningitis, and tuberculosis as suggested by Von Tröltsch and Jacoby, is considered by Schwartze of doubtful justification, on account of the risks of the operation, and the possibility of anomalies in the formation of the parts involved. The operation is, however, an INDICATIO VITALIS in these cases whenever symptoms of brain irritation are noticed."

Schwartze further says: "Past experience shows that the dangers from the operation itself are pyæmia, exposure of the middle fossa of the skull or the lateral sinus. Experience also shows that these two accidents last named may occur without injurious effect if the dura matter and sinus are uninjured and they may unexpectedly happen to the most careful surgeon from a mal-formation of the bone, which is, however, extremely rare."

The "indications" thus laid down by Schwartze do not seem to the writer sufficient to warrant a frequent resort to the operation. To consider them somewhat in detail: Of the first indication it cannot be admitted that "œdema, pain and fever" are pathognomonic of "acute inflammation of the mastoid cells with retention of pus", nor should I rely on an incision over the mastoid or ice applications alone to relieve inflammation of the cellules even though the above symptoms were accepted as pathognomonic of this condition.

As regards the second indication, "intermittent swelling". —It is of frequent occurrence where drainage from the tympanum is interrupted by the closure of a sinus from the cellules of the mastoid or by a clogging up of the tract of a dissecting tympano-mastoid abscess. It does not "threaten life".

The third indication refers to matter seeking to escape from the cellules into the external auditory canal. Instead

of liberating this where it presents it is proposed by Schwartze to establish an opening through the mastoid process. Here it is urged to operate "without hesitation" if "brain symptoms" are noticed. In other words, if the symptoms are severe, open the mastoid cellules for the liberation of purulent matter which is presenting on the superior wall of the external auditory canal. In my own experience fluctuation beneath the cutis of the upper posterior wall of the canal is usually due to the escape of pus from the attic and not from the cellules. Case V., briefly described on a previous page, presented almost, if indeed not all, of the indications laid down by Schwartze for opening the mastoid, for in addition to the symptoms mentioned in the report there was intermittent swelling over the mastoid, intense vertigo, nausea and vomiting, and elevation of temperature. All of these symptoms, however, yielded on the establishment of drainage through a free opening into the posterior superior wall of the canal where pointing was prominent.

Of the fourth indication it may be said that the establishment of drainage through the tympanum is not difficult in the conditions cited.

Schwartze's *Indicatio Vitalis* is based on "symptoms of brain irritation" in chronic suppuration. This is tantamount to recommending the trephining operation on the mastoid process for "threatened" pachymeningitis. Where periostitis interna is suspected of having reached the cellules it has been my own experience that drainage for the entire middle ear tract can best be maintained through the natural channel of the tympanum, and following out this course in practice has never been to my knowledge attended with fatal results. But should the difficulties attending this operation be urged against its adoption it may be said in reply that no safe guide indicating the employment of the trephine either for the prevention or for the

relief of pachymeningitis is known. Trephining into the mastoid for threatened pachymeningitis in this manner could only be regarded as a warrantable surgical procedure at an early stage when, unfortunately, no sure pathognomonic symptoms are recognizable.

One cannot but regard the expressions "threaten life", "brain symptoms", "symptoms of cerebral irritation", and the like, too frequently used in this connection, as untenable assumptions, and misleading and which, when accepted too confidently, tend to increase the importance of misconceived indications rather than the establishment of sound surgical principles.

It seems by no means improbable that the course of many cases of purulent inflammation, with symptoms that "threaten life", alleged to have been cured by the intervention of an operation of trephining, would have been equally satisfactory without this procedure. The patient's testimony as to relief in these cases must frequently be taken with some allowance; it is often of no value whatever, and, moreover, the advantages of the preliminary incision through the integument, where indicated, should be considered.

Intense inflammation of the tissues over the mastoid process, with redness and swelling, in the course of acute inflammation of the mucous tract of the ear, does not, however great the accompanying pain, always require active interference; the symptoms very often disappear spontaneously—especially in young children they frequently disappear as quickly as they come. But where such symptoms persist a free incision carried down to the bone will often be advisable even before fluctuation is detected.

Meningitis may suddenly develop in cases where the aural symptoms have not been severe or alarming: on the other hand the most urgent muco-periostial inflammation of the middle ear tract may exist, with so-called brain symptoms, without brain lesion.

The success I have so far attained in affording drainage through the tympanum in purulent inflammation of the middle ear tract and the doubtful benefit to be derived from an exploration into osseous tissues of the mastoid process, when possibly healthy, have deterred me so far from the latter procedure.

The progress of caries of the temporal bone differs from that of any other bone in that it has a large mucous-lined cavity, the secretion from which very much increases the difficulty of treatment. It has the advantage, however, over other bones under inflammation of having a nutrient periostial membrane lining it within whilst covered by the periosteum without, thus insuring rapid restoration under favoring circumstances.

A NEW OPERATION FOR THE RADICAL CURE OF CHRONIC PURULENT INFLAMMATION OF THE MIDDLE EAR TRACT.

By Samuel Sexton, M. D., *New York, N. Y.*

Since describing a form of chronic purulent inflammation of the attic of the tympanum, in a paper read before the society last year, it has occurred to me that something might be done for the relief of otherwise hopeless cases of otorrhœa by means of an operation. It seems specially desirable to cure these cases when the diseased organ becomes simply a reservoir for the retention of purulent matter liable at all times to infect the system. It is found that in a large number of cases where destructive inflammation has left only a small portion of the conductive mechanism, that this no longer serves to aid in the transmission of sound, but acts rather as an obstruction to drainage. Where the membrana flaccida and a portion of the ossicular chain only remain, the former often becomes thickened, its free edge inverted, and forming, with the foldings of the altered mucous membrane, a pouch below the tympanic attic for the retention of putrescent matters which escape slowly—in some instances by overflowing the pouch, in others through fistulous openings in its outer wall. In acute exacerbations from head catarrh, the means of escape for fluids become closed and hence the periodical "gatherings" which are a source of so much distress. Where granulation tissue or polypoid growths are present in the attic or antrum, drainage is still further inter-

fered with. The irritation, both local and reflected to other regions, is almost indefinitely continued under the ordinary treatment in many of these cases.

Having observed in a number of cases where the transmitting mechanism had been entirely destroyed by disease that a spontaneous cure had followed, leaving the entire tympanic cavity covered with a non-secreting membrane, and the tympanic ring free of membrane, it occurred to me that the curative action of nature might be imitated with advantage.

Last year the operation was first tried on a long-standing case of otorrhœa due to chronic purulent inflammation confined to the tympanic attic and mastoid antrum. In order to avoid the danger of using an exposed flame of light in connection with the administration of ether, an electric light to be worn at the forehead and retained in place by the ordinary head band, was used as shown in the cut.[1] Nitrous oxide gas was first tried as an anæs-

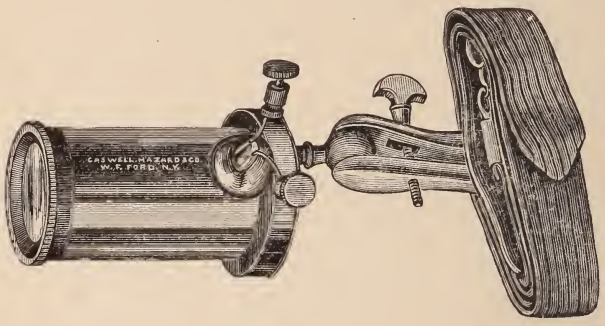


Fig. 1.

thetic, but owing to the spasmodic movements that usually take place when this agent is used it had to be abandoned.

[1]The 3-cell "B." battery of Messrs. Stout, Meadowcroft & Co., with a bichromate of potash fluid, will supply a current sufficient to run a 4 candle light for two hours and a half. Mr. Ford, of Messrs. Caswell, Hazard & Co., New York, can supply the apparatus complete at a cost of some $10.00.

Fig. 2. Natural size.

Where practicable, and if not contra-indicated, the patient's body may be elevated during the operation so as to bring the ear in the position we are accustomed to see it ordinarily. The first operation was successful and has since then been performed in a number of cases both among private patients and at the New York Eye and Ear Infirmary.

The object of the operation being to permanently clear the passage outward from the tympanum where drainage is interrupted in the manner described, and thus effect a cure, the anatomy of the parts to be operated on must be kept clearly in mind. The first step of the procedure is to separate the membrana flaccida from the edge of the auditory plate and to remove any portion of the membrana vibrans adherent to the auditory ring. If the malleus and incus remain *in situ* it is well to divide the tendon of the tensor tympani muscle, when present, where it leaves the handle just behind the short process and below the chorda tympani. The chorda tympani when remaining is then divided where it enters the tympanum at the pyramid and also at its exit into the canal of Huguier. The long process of the malleus, being also received into the glenoid fissure by means of this short oblique canal along with the chorda, may be more or less detached at the same time. The knife[1] shown in Fig. 2, has

[1] The handle of this knife is of the same size as in the instruments shown in Figs. 3 and 4; they are all made of steel.

in my own hands been found entirely satisfactory for this stage of the operation. The detached tissues and ossicles should now be removed with the forceps. It will frequently be found that the incus, having been displaced, still remains. It may be removed with the attic scraper, shown in Fig. 3, which is to be introduced from below and passed up along the inner wall of the tympanum, when the distal extremity is carried over the incus or malleus, if the latter bone remains. By gentle but persistent traction the ossicles can now be detached. Polypoid masses and granulation tissue, if present, are now to be removed with the scraper and cutting curette shown in Fig. 4, or cutting forceps, and the parts dressed with a four per cent. solution of cocaine to relieve pain.

There is usually free bleeding during the operation, often sufficient to protract it and very much increase its difficulties. [In my late operations this has been entirely obviated in some instances by preparatory treatment directed to the removal of granulation tissue.]

Fig. 3. Natural size.

Fig. 4. Natural size.

The effect of the unavoidable injury or destruction of that portion of the chorda tympani nerve passing through the attic nearly always manifests itself in some way where the nerve has not been previously destroyed by disease; but in my experience this has never been a matter of serious import, the disturbance of taste gradually disappearing without leaving this sense impaired.

After the operation the tympanum should be kept well cleansed, and light dressings of boracic acid sparingly applied after bleeding ceases and until healing of the cut and lacerated surfaces takes place. Subsequently salicylic acid powder may be applied where granulating tissue is slow to disappear, and its use continued until the parts cease to discharge and a cure has been effected. In some cases this powder is irritating at first, but tolerance is soon established.

In the cure resulting from this treatment, a dermoid transformation of the tympanum takes place, but mucus may occasionally gain admission from the Eustachian tube during recurrent head catarrh or on blowing the nose. This should be frequently removed with cotton-wool, and, if necessary, the drying applications renewed for a time.

Where the incudo-stapedial connection remains I would not hesitate to perform this operation, unless a very considerable portion of the membrana vibrans was present.

To my friend Dr. W. A. Bartlett, I am very much indebted for aid in arranging the large mass of records used in preparing the foregoing paper and in the operations here described.

Note.—Since reading this paper before the society I have seen for the first time Prof. Schwartze's *die chirurgischen Krankheiten des Ohres* appearing in DEUTSCHE CHIRURGIE, Stuttgart, 1885, in which he gives a *résumé* of the literature of operations on the transmitting mechanism of the ear, together with his own experience.

Although the procedures described are some of them similar to those in the operation of the writer, yet none of them were undertaken for precisely the same object. It is gratifying, however, to know that this line of surgery has such an able advocate and it is to be hoped that the future may witness its further development.

DISCUSSION.

Dr. C. R. Agnew, of New York:—There are a few points in the gentleman's valuable communication to which I desire to allude. I am led to infer that the drift of his experience has been away from opening of the mastoid.

Dr. Sexton:—Yes. By trephining the mastoid process in suspected imflammation of the cells. I stated that in all of these cases of periostitis externa, where there is obstruction, I have never had difficulty in obtaining drainage by a free incision into the attic and the posterior wall of the canal, usually by a small knife resembling a sharp-pointed tenotomy knife. In the posterior wall of the canal a larger knife may be employed.

Dr. Agnew:—I think that we cannot depend upon the trephine as we formerly hoped to do in improving drainage in these forms of suppurative inflammation of the middle ear, which have come to involve the mastoid cells. I think that in the future we shall be led to take away more of the external wall of the mastoid by the use of a chisel or some modified tool which will enable us to rasp away the external wall of the mastoid over an area certainly greater than the surface of a ten cent piece. The objection to the trephine in improving drainage from inflamed mastoid cells is that it does not expose a sufficient area of the cancellated structure of the mastoid. I do not see how much is to be gained by the operation of cleaning out the middle ear, which has been described. This is a true gutting of the middle ear.

DR. SEXTON:—The operation described is intended for the cure of chronic cases, and is not recommended for the relief of disease of the mastoid, as supposed by Dr. Agnew.

Dr. AGNEW:—In chronic cases, so far as my experience goes, we are not so much embarrassed by obstruction between the middle ear and the external auditory canal as by an insufficient vent for the mastoid cells, through which the discharge from them may escape. The great obstruction to drainage from the middle ear and mastoid is the drumhead and the indirect passage from the mastoid cells. I have now under observation a case which Dr. Webster and I have watched with care, in which the drumhead appears to be the great barrier to a free exit of matter from the middle ear. Where the drumhead has been swept away, we have more frequently a free drainage. I do not think that drainage can be improved by the operation described.

It seems to me that the drift of the author's experience has been rather away from opening into the mastoid either by the trephine or any other instrument. My inclination is becoming stronger and stronger to open into the mastoid in a larger number of cases. In chronic suppurative otitis, when mastoid cell symptoms exists, I think we should remove as much as we can reach of the surface of the mastoid. The cases of most remarkable recoveries have been those in which from a necrotic process the shell covering the mastoid has been largely swept away. The photographic plates which have been exhibited by Dr. Sexton show many instances of this, where free openings have resulted from necrosis of the internal plate of the mastoid and healing resulted.

I should like very much that our instruments could be so improved that the operation of sweeping away the external plate of the mastoid could be performed. It might be

done by a tool similar to that which carpenters use, which consists of an elliptical shaped knife, the horns of the ellipse constituting the handles, thus making a drawing knife. We might then, with a dragging motion, rasp away the external surface. By doing this I think that we should accomplish more than by attacking the middle ear. I cannot see how the chances of recovery are improved by the operation described of cleaning out the cavity of the middle ear, although I can understand that in some rare cases that might be desirable.

Dr. Sexton:—I think that Dr. Agnew must have confounded two operations, one for acute and the other for chronic cases. The "cleaning out process" is only for old chronic cases, simply for the cure of otorrhœa.

Dr. Agnew:—In old chronic cases, matter usually finds its way into the external canal and we have to do with a chronic inflammation of the mastoid cells rather than of the drum cavity itself.

Dr. H. Knapp, of New York:—The supra-tympanic cells resemble to a certain extent the frontal sinus. The frontal sinus has a direct natural outlet through the infundibulum into the nose. When this is closed by disease, the lateral part of the sinus over the orbit dilates, and the cavity is more easily reached and more effective drainage is obtained by opening the sinus through the orbit. In a like manner, I believe that we obtain, in most cases, with less difficulty, more effective drainage of the supra-tympanitic cells by opening the mastoid with which they communicate.

Dr. David Webster, of New York:—I would ask Dr. Sexton what effect this scraping of the tympanic cavity has upon hearing?

Dr. Sexton:—In the cases where the operation was performed for the relief of chronic otorrhœa, where there was obstruction to drainage through the attic, the removal

of the ossicles had no effect upon hearing. The object was simply to relieve a long standing trouble which could be relieved in no other way. I should not hesitate to perform the operation if otherwise indicated, where the hearing was very bad, even were the incudo-stapedial connection present. The hearing is sometimes just as good after separation of the stapes from the rest of the chain of bones as before. I should not operate when there was any probability of hearing being impaired thereby.

Dr. J. Orne Green, of Boston: — The reader has spoken very strongly against opening of the mastoid by the trephine or other instruments. I simply want to call attention to the anatomical condition present. It does not seem as though his method could afford such perfect and free drainage as we all acknowledge that we need. If you look at this specimen (indicating), here is the antrum and here is the point where he gets drainage. The mastoid cells run one inch or more below that and how he is going to get as thorough drainage by the method he describes, where he cannot insert a drainage tube, as he can by opening the lower part of the cavity, I cannot understand. If thorough drainage and antiseptic cleanliness are what we desire, the outside opening in certain cases must be more thorough than anything possible inside, aside from the objections arising from the minute parts through which he has to work.

In those cases in which the disease is distinctly in the mastoid cells, I want to put myself on record as in favor of opening the cavity of the abscess in the lower part and cleaning it out, rather than of attempting to clean it out by a minute opening in the upper part, which seems to be what the gentleman is in favor of, in what we must call his criticism of trephining through the external cortex.

Dr. J. A. Andrews, of New York: — I would ask Dr. Sexton if he secures drainage through the external canal

by means of a rubber or a metal drainage tube in cases of suppurative processes?

Dr. Sexton:—The discussion applies to acute, not to chronic cases. In cases of periostitis externa as alluded to by Dr. Green, no one would hesitate to enlarge a small sinus. I should not think, however, of perforating the cortex for periostitis externa only. In regard to the mode of drainage, two or three fine threads of catgut are sufficient to keep the incision open.

If I may be permitted to remark in regard to what Dr. Agnew said a few moments ago, I have found myself much more apt to cut freely into the tympanic attic in these cases than before.

Dr. Agnew:—Will the gentleman tell us on what surgical grounds he prefers to cut into the middle ear to improve drainage, to cutting through the mastoid externally? What are his objections to cutting through the mastoid which leads him to suggest a new operation?

Dr. Sexton:—I wish to put myself particularly on record as objecting to this operation of trephining the mastoid for the "saving of life", as it is called, and for the cure of pachymeningitis.

As regards drainage of the middle ear tract we have a large passage from this tract which is covered by the drumhead. I should cut the drumhead through as freely as is necessary to give relief. The closure is sometimes due in part to swelling of the periosteum. If the dissecting abscess of periostitis externa extended to the cortex, I should cut it there. If it went into the canal a little way, I should cut it there. I have had good results from that practice. If in a case of periostitis externa, I was sure that there was also periostitis interna, involving the cellules of the mastoid, I should not hesitate to trephine. The difficulty of diagnosis is, however, very great.

Dr. Agnew:—I would ask what indications Dr. Sexton

finds for incising the middle ear, which are not more positive for opening into the mastoid? How does he get better indications for cutting into the middle ear than into the mastoid cells?

DR. SEXTON:—The indications are precisely the same. We have mainly to deal with a periostitis. Wherever bulging is seen or pus presents, we should open freely. If there is an interruption to the discharge from the attic, we should cut freely into that early and thus limit the process. My preference for drainage through the middle ear tract is the result of experience. I have always found this course practicable.

DR. AGNEW:—The surgical indications, whether the bladder should be opened above the pubes or through the perineum are perfectly clear. I want the gentleman to give us the differentiating points,—I want him to tell us what enables him to determine that he should cut into the middle ear rather than into the mastoid cells externally. Otherwise this is a mere matter of experiment.

DR. SEXTON:—I was not aware that surgeons were agreed as to the best method of entering the bladder. I think that there is still some dispute as to whether the supra-pubic incision is ever the better in certain cases. The same remarks may be applied to the treatment of the ear. I can only say that I have been satisfied with my course. In acute periostitis externa, where there is much swelling over the mastoid process, I should incise after waiting a sufficient time. If the case were urgent, I should make the incision at once without waiting for fluctuation. Cases of periostitis externa often come under observation where the canal is almost completely obstructed by swelling of the upper and posterior wall: in such cases I incise at that point.

DR. AGNEW:—What do you mean by periostitis externa?

Dr. Sexton:—Inflammation of the periosteum lining the external surface of the mastoid bone.

Dr. Agnew:—If you had swelling over the mastoid with more or less pain and tenderness, and with a history of suppurative middle ear trouble, rather than make Wilde's incision, you would cut into the middle ear?

Dr. Sexton:—Not at all. I should open where the pus presented.

Dr. Agnew:—What are the relations of your operation to periostitis externa?

Dr. Sexton:—Inflammation of the periosteum exterior to the tympanum, I call periostitis externa. It does not always reach the mastoid process, sometimes going no further than the beginning of the external auditory canal. If left alone at this stage, however, it may extend outwardly, first involving the supero-posterior wall of the canal and finally the mastoid process. In the far greater number of cases, the symptoms, if sought for early, will be found manifesting themselves first at the inner end of the canal as I have described them.

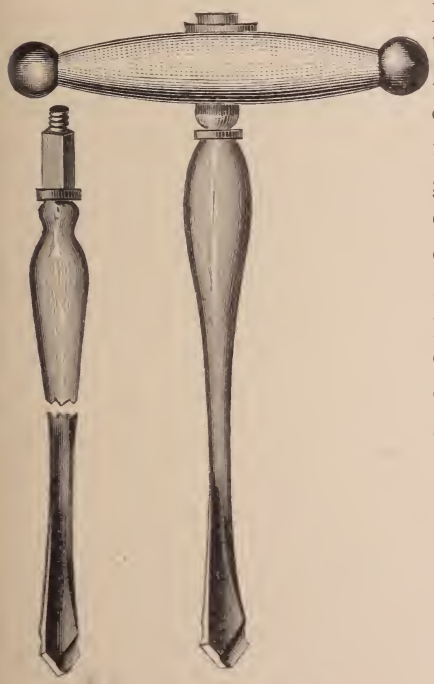
Dr. Agnew:—We have all been incising the canal. Dr. Sexton in his operation goes further through the seat of the drumhead and cleans out the middle ear.

Dr. Sexton:—The operation of "cleaning" out the middle ear applies only to chronic processes. I do not apply it to acute cases which we are now discussing.

ON CERTAIN TECHNICAL DETAILS RELATING TO PERFORATION OF THE MASTOID PROCESS, AND THE AFTER-TREATMENT.

By Albert H. Buck, M. D., *New York, N. Y.*

In a series of communications to the "Archiv für Ohrenheilkunde", Professor H. Schwartze, of Halle, Prussia, lays down in very clear and positive language what he believes to be the best manner of perforating the mastoid process and of conducting the after-treatment. As is well known to members of this society, he very much prefers small gouges and chisels to the drill in accomplishing the desired object. While I hesitate, with my comparatively small experience, about disputing the correctness of the conclusions drawn by one who has already perforated the mastoid process one hundred times, I am satisfied that, so far as the form of drill commonly employed in this country is concerned, Schwartze's condemnation is unjust. My impression is that his remarks have reference to some form of drill or boring instrument totally different from that which is pictured here and which



is a copy of that published in Ashhurst's "International Encyclopædia of Surgery".

As some of the members present may not have read Schwartze's series of articles, I will repeat here, in the form of brief extracts, what he has said in regard to the employment of drills:

"The danger attaching to hand drills lies chiefly in the uncertain manner in which they can be guided, in the facility with which they are made to travel in the direction in which we do not want the instrument to go, especially if the bone is somewhat softened."

"The narrow opening in the bone affords opportunity for only a very inadequate irrigation of the diseased cavity in the bone, and generally at the end of a few days the growth of granulations prevents the irrigating fluid from entering the artificially established fistula. Furthermore, experience shows that the use of boring instruments is accompanied more often than usual by traumatic erysipelas and by severe septic fever."

Another danger has been suggested—not by Schwartze, so far as I know, but by some surgeons in New York—viz., that of suddenly plunging the instrument into the lateral sinus, into the brain, or into some other important part.

Schwartze's first objection is of a personal nature and can not be overcome by arguments. I can only say that in using the drill I have never been conscious of its going in the direction in which I did not want it to go. In one of my cases, it is true, it managed to lay bare the fibrous wall of the lateral sinus; but the fault in this instance was not with the instrument, but with my knowledge of anatomy.

In regard to his statement that the instrument is especially liable to go astray when the bone is softened, I may say that the very fact that the bone is in this condition is almost sure to lead the operator to proceed cautiously in his manipulations. However, this softening of the bone is the condition in which small bone chisels and gouges may be used with peculiar advantage. But the cases in

which the outer portion of the mastoid bone is softened are exceptional, and my remarks throughout this article have reference rather to what is commonly encountered in practice. I might amplify this statement by saying that there are pathological conditions of the mastoid process in which the drill alone could not possibly suffice for the attainment of the purpose desired.

The second objection—the narrowness of the opening made by the drill—applies clearly not to drills in general, but to some particular pattern and size of drill; for it is plain that they may be manufactured of any size desired. Of the three sizes which I am in the habit of employing, the largest measures a trifle more than one quarter of an inch, the smallest a trifle more than one eighth of an inch, in diameter. I always employ the largest drill at the beginning of the operation and endeavor to give the artificial opening a diameter of not less than one quarter of an inch until I am in close proximity to the antrum. Then I finish the remaining portion of this artificial channel with one of the smaller drills, and sometimes even with the aid of a dentist's burr or reamer—a very safe but not a very efficient instrument unless run by a dental engine. Such an opening into the antrum affords all the space that is necessary for efficient irrigation and subsequent drainage. If a sequestrum of bone is encountered, the channel should not be narrowed on reaching the antrum, but rather widened. Up to the present time, however, I have always found bone sequestra lying in a comparatively large cavity, the outer limits of which approached much nearer to the outer surface of the mastoid process than does the antrum as ordinarily encountered in these operations. It has, therefore, been a comparatively easy matter to either break the sequestrum of bone and extract it fragment by fragment, or to make the opening large enough to extract the mass entire.

So far as Schwartze's last indictment is concerned—

viz., that the use of boring instruments is accompanied more often than usual by traumatic erysipelas and by severe septic fever—I can only say that in my experience these accidents are rare; and I do not believe that a comparison of Schwartze's reported cases with my own would show that these complications had occurred more frequently among the latter than among the former. In fact, my impression is that they are of more frequent occurrence in his series of cases than in mine. However this may be, I should not feel like drawing any other conclusion from these facts than that *the hygienic surroundings were better in one class of cases than in the other.*

As regards the objection raised by surgeons in this country—viz., that in the use of the drill there is danger of plunging it into the lateral sinus, into the brain, or into some other important part—I will reply by repeating what I have said elsewhere: "The forefinger of the hand which guides the drill should rest firmly against the bone. If this precaution be taken, there will not be the slightest danger of our suddenly plunging the sharp point of the drill into parts which might thereby receive serious damage." To this I may add the further remark that the rules governing the perforation of the mastoid process with the drill are now laid down with such clearness that no person has any business to direct his instrument toward any place where he may inflict serious damage, should his instrument make such a plunge as the objectors anticipate on theoretical grounds. But there is still another reason, of a mechanical nature, why such an uncontrolled plunge of the drill is not at all likely to occur. All those who have used the pattern of drill which is now under consideration will bear me out in the statement that, by reason of the peculiar disposition and relations of its cutting edges (the surface of bone cut by them representing that of a shallow cone), ample warning is conveyed to the fingers or hand of

the operator when the point of the instrument is beginning to enter a cavity. When this sensation is felt, the surgeon should lay aside the drill and ascertain by probing exactly what are the conditions existing at the bottom of the wound in the bone. According to the results ascertained by the exploration with the probe, he may either proceed with the work of drilling or he may resort to other measures. Those who are timid or who distrust their knowledge of the topography of this region, may readily have the drill provided with a movable guard, and so avoid all possibility of falling into the dreaded ditch.

Thus far I have simply attempted to answer the objections raised against the drill. I now propose to compare the two operative procedures and to point out what seem to me to be the objectionable features belonging to the chiseling method. I may say at the start that I have no disposition to condemn this method. The successful results obtained by Schwartze place it on a secure basis, beyond the reach of any such condemnation. But when so high an authority claims for it such great superiority over any other method, I feel that surgeons generally will accept his statement as final and authoritative. It seems to me, therefore, that at the present time I may very properly enter my protest against the acceptance of the chiseling method as the one to be preferred to all others. I believe that I can show that the use of the drill secures at least as successful results, and is as worthy to be adopted by surgeons, as the other method.

In the first place, in employing chisels for the purpose of cutting a channel through the mastoid process down to the antrum, we are obliged to make a somewhat larger wound in the superjacent soft parts. This means a more conspicuous scar after healing has taken place. This is perhaps a trivial objection. Of a more serious nature is the necessity of chiseling away an extensive portion of the

outer surface of the bone; for, in cutting from without inward, we can not, as with the drill, make a cylindrical channel, but are obliged to remove a conical mass of bone, very broad at the outer surface of the mastoid process, and proportionately narrow at the antrum. In this manner a large number of comparatively healthy mastoid cells are laid bare, and many small blood-vessels in the substance of the bone must necessarily be divided. This establishment of a decided excavation in the bone leaves a correspondingly ugly depression in the skin behind the ear after the parts have healed. I also believe that this very extensive destruction of bone-tissue delays the final healing to a material degree.

In the next place, more time and more manual skill are required in chiseling out a suitable artificial channel in the bone than is the case when the drill is employed. Furthermore, the procedure is not wholly free from danger. Schwartze himself admits that in one of his cases death resulted from traumatic meningitis, caused by injury inflicted by a splinter of bone.

All the objections enumerated here may fairly be considered as trivial, if it can be shown that by the chiseling method a larger proportion of patients are cured than by the other method, or if it can be shown that, while the ultimate results are about the same in both methods, the patients get well more rapidly when the chisel is used than when the drill is employed.

Schwartze's statistics of 100 operations tell the following story:

Cured, 74 cases - - -	74 per cent.
Not cured, 6 cases - - -	6 per cent.
Died, 20 cases - - -	20 per cent.

(In only one of the fatal cases could death be attributed to the operation itself.)

In my own cases (24 operations) the results were as follows:

Cured, 17 cases	- -	nearly 71 per cent.
Not cured, 3 cases	- -	- 12½ per cent.
Died, 4 cases	- -	nearly 17 per cent.

(Death was not due in any of these cases to the direct effects of the operation.)

So far as it is legitimate to compare the results obtained in a small number of operations with those secured in a much larger series of cases, we may draw the inference that the drilling method furnishes as successful results as that by means of chisels.

If we compare the two percentages of "cases not cured", the chiseling method seems to furnish better results than does that in which the drill is used (6 per cent. of all cases in the former method, 12½ per cent. in the latter). I am convinced, however, that a comparison of the two methods, so far as these particular statistics are concerned, is valueless. An illustration or two will suffice to show this. In one of my "not cured" cases it was ascertained — subsequent to the operation — that the pre-existing sinus in the mastoid process led far upward and inward into the cranial cavity. If this fact had been known at an earlier date, the uselessness of any operative interference short of excision of a large part of the temporal bone would have been apparent. In a second case, which is included in this category of "not cured" cases, because the pre-existing fistula in the external auditory canal failed to heal after the operation, it would have been necessary to remove a great deal of the upper bony wall of the external auditory canal in order to reach the seat of the caries. This, of course, was not contemplated in the operation. So far as the mastoid process itself was involved, this case should properly be counted among the "cured", inasmuch as the external

wound healed as early as on the sixteenth day, and complete and permanent relief from pain was afforded. In the third case included in this category the patient passed from under my observation at the end of thirteen months, and I am unable to state the ultimate result.

Finally, if we compare the two methods as regards the average length of time required in effecting a cure, we shall find that the drilling method does not suffer by the comparison. According to Schwartze's own estimates, the average duration of the after-treatment, reckoned from the date of the operation to the time when the external wound healed and the discharge from the ear ceased, was about eight months. In the acute cases alone the average duration of the after-treatment was about three months. In five of his cases the after-treatment was completed in four weeks.

In my own cases the average duration of the after-treatment in the successful cases was forty days. In my first series of sixteen operations I frequently carried the drill down to the vicinity of the antrum, but not actually into this cavity, and therefore did not establish as thorough drainage as would have been secured if the more perfect operation had been performed. In this series of cases the average duration of the after-treatment in the successful cases was forty-four days. In the last series of eight cases my aim was always to reach the antrum, and to establish an opening into it of not less than 4 mm. in diameter, and in this series the average duration of the after-treatment in the successful cases was only thirty-four days.

In the light of these facts I believe that I am justified in maintaining that in the ultimate results obtained by the two methods there is nothing to warrant the statement that chisels or gouges are greatly to be preferred to the drill in establishing an artificial opening in the mastoid process.

In a previous part of this paper I made the remark that

the extensive destruction of bone-tissue necessitated by the chiseling operation materially delayed the final healing of the wound. While this is probably true, I am disposed to believe that a more plausible reason exists why the final healing took place so much later, on the average, in Schwartze's cases than in mine. I refer to the extraordinarily thorough plan of after-treatment adopted by Schwartze. The following condensed *résumé* will convey some idea of the complicated character of these therapeutic procedures. Schwartze recommends, in the first place, that a drainage tube should be inserted in the artificial bony canal immediately after the operation. After each dressing of the wound it is to be reintroduced. When the insertion of this larger tube becomes too painful, the so-called "lead nail" (*Bleinagel*), bent at a right angle and provided with a slit-like opening through which a piece of tape may be passed, is to be substituted for the drainage tube. This little instrument is to be gradually reduced in size as time goes by, but it is not to be wholly removed until after the lapse of months. In speaking of the question, When shall the lead nail be permanently removed? Schwartze admits that this is a difficult matter to decide. He says that under no circumstances should it be removed until the discharge from the deeper parts of the ear shall have been reduced to an insignificant amount. All granulation processes in the auditory canal and middle ear must first have ceased, and all swelling of the soft parts of the external meatus must have disappeared. Finally, water injected through the Eustachian tube into the middle ear must continue for a considerable period of time to escape from the outer meatus in a perfectly clear state and without showing particles of bone-sand. In a matter like this, he says, we should hold fast to the general principle that it is better to keep the fistula open by artificial means for an unnecessarily long period of time than to remove the lead

nail prematurely. "The former course never leads to any harm—in fact, it scarcely causes the patient any inconvenience after he has become accustomed to the presence of the nail, while the latter course may entirely frustrate the permanent good results of the operation."

Perhaps I may be mistaken, but it seems to me that a great deal of this interference might advantageously be dispensed with, to the gain of the patient in personal comfort and to the relief of the surgeon, who must necessarily spend many wearisome hours in carrying out these complicated measures. The two things aimed at in Schwartze's plan of after-treatment are the removal of every vestige of decomposing organic material (cheesy and foul pus, carious bone, etc.), and the maintenance of an unobstructed outlet for the discharge of pus and for the introduction of cleansing fluids. Theoretically, it would seem as if there could be no guarantee of safety unless Schwartze's plan were carried out in all its details; practically, I believe it has been shown that fully as good results may be looked for from the adoption—in all but the exceptional cases to which I have already referred—of the much less perfect antiseptic method which I have been in the habit of following. This method, in brief, is as follows: After a satisfactory artificial opening has been established in the bone, I cut out, by means of a small bone-gouge, a small channel in the surface of the bone from the bottom of the fleshy wound to a point in the artificial bony channel, fully one quarter of an inch distant from the outer surface of the mastoid process. The external wound, it will be remembered, is not directly over the spot where the opening is made in the bone. As a consequence, the anterior lip of the wound when left to itself slides backwards such a distance as to cover up entirely the mouth of the artificial sinus. By cutting out a shelving gulley, such as I have described, we shall remove every obstacle to the free es-

cape of fluids from the artificial channel in the bone, and at the same time we shall leave all the bony support that is necessary to prevent the formation of a depressed scar. This gulley serves another purpose—it plays the part of a director along which the end of the nozzle of our irrigating instrument may be conducted surely, and with the minimum amount of discomfort to the patient, into the artificial sinus; and, if at any time there is reason to believe that the artificial channel in the bone is obstructed, it is a simple matter, by means of this gulley, to pass a curved probe into it and overcome the obstructions. In the next place, in determining when I shall abstain from further irrigating procedures, I am guided by the following considerations: The chief danger of septic poisoning exists during the first twenty-four to forty-eight hours following the operation. The divided blood-vessels and lymphatics in the substance of the bone are still gaping, and more or less decomposing pus, etc., is just at that time particularly likely to come in contact with them. Antiseptic washings of all these parts are therefore specially called for during the first forty-eight hours. To be on the safe side, I generally keep up the irrigations (bi-chloride of mercury solution, 1 to 2,000 or 3,000) until the fourth or fifth day. By that time the processes of granulation and suppuration are thoroughly established in the injured bone, and, as it seems to me, the danger of septicæmia is practically over.

The histories of the cases on which these remarks are based are given here in the briefest possible outlines. The first series of sixteen cases has already been published at somewhat greater length in my treatise on ear diseases, but of the last eight cases, all of which occurred in private practice, only one has previously been reported. They are arranged in the order of their occurrence.

Case I.—Female, aged forty-seven. April 8, 1871. An acute purulent inflammation of the right middle ear since the latter part of the previous December. On April 1st the discharge diminished in quantity, the ear became painful, and there was occasional vomiting, with slight delirium. On examination I found that the external auditory canal was closed by œdematous swelling of its walls, and that the pus was being discharged chiefly through the Eustachian tube. Wilde's incision; poultices.

April 18th.—Comparative freedom from pain since last date. Discharge from meatus reëstablished.

June 5th.—Occasional attacks of pain since last date. Severe attack the preceding night. Mastoid tenderness. Two leeches applied.

15th.—Steady increase of pain despite the application of leeches on several occasions.

16th.—Sinus discovered leading from the meatus upward and backward into mastoid cells. Bone perforated with drill at usual spot. No pus found. One probe introduced into opening in the meatus encounters another introduced into the opening made by the drill.

Rapid improvement followed this operation. On July 27th it was found that the discharge from the meatus had ceased, that no trace of a sinus could be discovered in this canal, and that the external wound had healed.

Case II.—Female, aged sixty-two. July 10, 1872. Nine weeks previously patient began to suffer from pain in and behind the left ear and extending over the entire left side of the head. For two full days the pain was severe. After that, a steady, dull aching remained, with tenderness on pressure behind the ear. About two weeks before she visited the Infirmary the acute pain returned and continued, with occasional remissions, up to the time of her visit. On examination, the meatus was found nearly closed by a

falling forward of the posterior cutaneous wall. Membrana tympani invisible. No appreciable tenderness in the meatus. No discharge. Tenderness over the mastoid process, and also over the lower part of the parietal bone. Incision of the integuments and periosteum covering the mastoid process. No pus found.

July 13th. — Little or no relief afforded by the incision. To-day the auricle is pushed forward by a swelling behind the ear. Incision entirely healed. A second incision gave exit to about half an ounce of pus. No roughened bone or sinus discovered.

18th. — Comparative relief from pain until last night, when it again became severe. She refers it to the mastoid process, the top and back of the head. The meatus is less swollen and the membrana tympani can now be seen. It is entire, but of a very tough, opaque, tendinous appearance. Eustachian tube open. The entrance of air is accompanied by râles. No brain symptoms. The mastoid process perforated with a conical drill. The outer surface of the bone found to be in every respect perfectly sound. At a depth of about one fifth of an inch pus was found filling a cavity of about the size of a filbert. Pus removed with pledgets of cotton, and outer orifice of the cavity enlarged sufficiently to admit the end of my little finger.

19th. — Patient much relieved by the operation, but she still complains of soreness over the back and side of the head. Pressure over the left occipital and parietal regions produces pain.

20th. — Severe pain in the head, behind the mastoid process. Appetite only moderately good. Is losing strength. Stimulus ordered. Wound discharging freely.

22d. — Still severe pain behind the mastoid process. Skull trephined about three fourths of an inch behind the mastoid process, at the point of greatest tenderness. The

outer surface of the bone appeared to be perfectly healthy; but, on withdrawing the trephine, after sawing through the outer table, the circular track was found to be filled with healthy pus, which had welled up from the intervening cancellous diploë. No appreciable softening of the bone. The removal of the inner button of bone exposed to view a tense, deep-red dura mater, but no pus. The subsequent oozing of venous blood from the ruptured branchlets was readily checked by laying a pledget of cotton in the circular opening.

23d, 11 A. M.—Patient slept a part of the night. This morning she has considerable heat of skin. Pulse 100 and feeble. Less pain in the head; 8 P. M., pulse 106 and feeble; intellect perfectly clear; the discharge from the mastoid process appears to have nearly ceased; vomited once this evening.

24th, noon.—Patient is evidently sinking; pulse 110 and very feeble; respirations 44; no râles over anterior and lateral portions of the chest; intellect still clear, but she has not sufficient strength to speak in an audible tone when answering my questions. She died on the 26th, apparently from exhaustion.

Post-mortem examination refused by the friends.

CASE III.—Male, aged twenty-one. September 4, 1872. Acute inflammation of one ear twelve weeks previously, as a result of bathing. Two weeks later the ear began to discharge. Four days previously the discharge had ceased and pain had developed in the mastoid region, which had also become tender to the touch. At present the skin covering this bony process is red, tender, and swollen. There is marked prolapse of the posterior cutaneous wall of the external auditory canal, concealing the membrana tympani from view. Bone perforated with the drill, abscess found at a slight depth, external opening then enlarged with

a cone-shaped reamer, and cavity in bone thoroughly cleansed. Patient was not seen again, but he wrote during the following November that the external wound had healed within ten days after the operation, and that he had been perfectly well since then in every respect.

CASE IV.—Boy, aged eleven, of consumptive appearance. September 11, 1872. Acute inflammation of the left middle ear, with purulent discharge, dating back one week. To-day the discharge ceased, and the pain in the ear became more severe. Pulse 108, and feeble. Tenderness on pressure, and œdema of the left mastoid integuments. External auditory canal closed by the swollen condition of its cutaneous walls. Operation performed with drill, and mastoid cells reached a short distance beneath the outer surface of the bone. No pus found. Marked congestion of the mucous membrane lining the cells. The thin, bony septa yielded readily to the pressure of a steel director.

September 13th.—Entire freedom from pain. Discharge from the meatus has returned. Ordered iron and cinchona bark.

16th.—Continued improvement.

21st.—Patient has night-sweats and hurried breathing.

Although I never heard from this patient subsequently, I have very little doubt that he must have succumbed to pulmonary phthisis, superinduced, or at least hastened, by the profuse otorrhœa (both from the meatus and from the external wound).

CASE V.—Male, aged fifty-six. October 12, 1872. Acute purulent inflammation of the left middle ear in early manhood, leaving a perforated membrana tympani. Last August an acute inflammation again developed in the same ear, and was characterized by unusually severe pain.

Discharge intermittent. Toward the end of August he had a rigor, followed by a return of the pain, by discharge. and fever. Pain very severe, and involving mastoid region, articulation of jaw, and entire side of the head. Pain lasted for about ten days. There was tenderness over the mastoid process. Auricle was dislocated forward. Then the acute symptoms abated, and patient remained comparatively free from pain until about October 5th. Pain then returned, and was once more quite severe. No evidences of acute inflammation found on examination of the deeper parts of the ear. Mastoid integuments, however, were still tender on pressure and œdematous. Operation performed with drill. Bone found to be compact to a depth of three fifths of an inch. Wall of lateral sinus exposed, thus showing that the drill had been applied too far backward.

October 13th.—Patient passed a comfortable night, without pain.

14th.—Pain has returned again. Operation performed a second time, the drill being applied at a point nearer to the auditory canal. Mastoid cells found to be small, and intervening septa hard and thick. No pus found.

November 14th.—External wound has not quite healed. Discharge from meatus has ceased. There has been no return of the pain since the operation.

(I afterward learned that the external wound healed soon after he returned to his home, and that the cure had proved to be a permanent one.)

Case VI.—Female, aged thirty-six. January 15, 1873. About one week previously she contracted an acute inflammation of the right middle ear. Pain severe, and only partially relieved on the appearance of a purulent otorrhœa at the end of twenty-four hours. Pain soon returned, and increased in severity until it became almost intolerable.

It involved the entire side of the head, and was accompanied by tenderness of soft parts in front of and behind the ear. On examination, the external auditory canal was found to be closed by œdematous swelling of its cutaneous walls. Tenderness and moderate swelling of mastoid integuments. Wilde's incision; poultices.

January 16th.—Patient has experienced no relief from the incision, and is evidently in great suffering. Mastoid bone perforated with the drill to a depth of half an inch. Cells few in number, and septa thick and strong. No pus found. Poultices to be used freely.

17th.—Pain is much less severe, and patient feels better in every respect. Appetite has returned.

22d.—Continued improvement.

29th.—Entire freedom from pain. Scarcely any discharge from the external auditory canal. External wound healing rapidly. Discharge from meatus ceased on February 10th, and the external wound healed on or about February 15th.

Case VII.—Female, aged twenty-six. Feb 12, 1873. About ten days previously she contracted an acute inflammation of the left middle ear, followed by discharge from the auditory canal. Pain, although not severe, still continues. Incision of red and swollen membrana tympani.

March 1st.—For ten days subsequently to the paracentesis patient remained free from pain. Then, however, it returned, and was referred chiefly to the mastoid region. To-day she refused to have the bone perforated, but consented to have a Wilde's incision made.

12th.—Only temporary relief followed the incision, and patient now consents to having the bone perforated. Instead of making the opening at the usual spot, I perforated the bone near the tip of the process, with the idea of securing better drainage from an opening in this lower portion of

the system of air-cells. No pus was found. Facial erysipelas developed, but ran a comparatively mild course.

On March 17th the pain again became acute in the mastoid region, and I then made a second opening in the mastoid process at the point usually selected. At a slight depth a cavity containing pus was reached.

On the 29th of March, when the patient returned to her home, the discharge from the external auditory canal had entirely ceased. She had been free from all pain for several days, and the external wound had nearly healed. While I did not see her again, I have no doubt that final and complete healing of the latter took place within a week or ten days subsequently.

Case VIII.—Male, aged twenty-three. March 19, 1873. From this date to April 3d patient was under treatment for an otitis media mucosa on the left side. The treatment adopted—the injection of a very weak solution of alum through an artificial opening in the drum-membrane—set up a severe inflammation of the middle ear.

April 4th.—Patient in great suffering. The pain developed about twelve hours after the injection of the alum solution, and soon became severe. From the first the patient referred the pain to the mastoid region and to that lying just above the auricle. Tenderness on pressure found on examination. An incision through the bulging posterior half of the drum-membrane afforded escape to pus, and mitigated the pain. Five leeches were also applied behind and in front of the ear.

From this time to April 13th comparative freedom from pain. There was, however, a constant purulent discharge from the ear, and the mastoid tenderness persisted.

16th.—Steady increase in pain since the 13th. Wilde's incision; poultices.

19th.—Only temporary relief from the incision. Tem-

perature 101.5° F., pulse 92, and weak; motion of jaws painful; meatus slit-shaped vertically. Bone perforated with drill to a depth of three fifths of an inch. No pus found.

The operation was not followed by marked relief, as is generally the case. The pain did not begin to diminish noticeably until on the 22d and on the 29th it was again severe for a short time. After that date the progress toward recovery was rapid.

On June 1st I found that the discharge from the auditory canal had ceased and that the outer wound had entirely healed.

Case IX.—Male, aged thirty-nine. October 22, 1873. Acute inflammation of the left middle ear in previous July, after sea-bathing. An attack of convulsions on the seventh or eighth day. At the end of four weeks a large abscess developed in the mastoid region, and broke spontaneously. At no time was there any discharge from the external auditory canal. After the rupture of the abscess the patient continued to experience a great deal of pain, chiefly in the left temple. He also had frequent attacks of dizziness. On examination, the membrana tympani and adjacent parts were found to be almost free from evidences of inflammation. Behind the ear there was a small fistulous opening leading to a bone sinus in the upper part of the mastoid process.

Operation performed on October 23d. Drill was placed over the orifice of the sinus and was carried to the depth of three fifths of an inch. No pus found.

January 15, 1874.—A fistulous opening still remains behind the left ear. From the direction taken by the probe, and from the distance which it traverses in its upward and inward course, there can be very little doubt that the source of the pus is not in the mastoid process, but at some spot

within the cranial cavity—probably a localized caries of the cerebral aspect of the temporal bone. So far as pain is concerned, the patient has obtained the desired relief from the operation, but so far as the fundamental disease is concerned, he seems to be in presisely the same condition now as he was before the artifical opening was made. I do not know what ultimately became of the patient, as he declined to submit to any further treatment.

Case X.—Male, aged thirty. February 7, 1874. Fifteen months ago patient was attacked with a severe pain in the right ear. The inflammation soon spread to the mastoid cells, an abscess formed behind the ear, and at the end of the eighth week it broke spontaneously, affording him relief from his prolonged suffering. The fistulous opening which remained after the abscess broke did not heal up until six months later. A purulent discharge from the ear has been present from almost the beginning of the attack, and is now occasionally tinged with blood. Two days ago the pain returned. It is confined chiefly to the mastoid region. On examination, the external auditory canal is found to be narrowed (slit-shaped almost vertically) to such an extent that the deeper parts can not be seen. The discharge consists of pus tinged with blood. No tenderness on pressure over the mastoid process or in front of the tragus. Three leeches applied to the mastoid region.

May 23d.—The pain was relieved by the leeches, and patient went to the country for a few weeks. Two days ago the pain returned and the discharge from the ear became more abundant. The pain is referred to the right temple. Warm douche to be used freely.

27th.—Pain continues. Blister to be applied in front of the ear.

June 3d.—Entirely free from pain.

July 9th.—During the past three weeks he has again

suffered a great deal from pain involving the entire right side of the head. Diarrhœa has set in, and a fistulous opening has again established itself behind the ear. The discharge of pus from this opening is quite abundant, and there is no swelling or tenderness in the vicinity. A large polypoid growth fills the external auditory canal. After removing this mass with the snare, I discovered, by aid of the probe, that the inner and posterior portion of the meatus (vicinity of antrum) was in a carious condition. The probe, introduced into the sinus behind the ear, encountered denuded bone, and engaged itself in a small opening in the mastoid process which led into a cavity containing loose fragments of bone. The patient having been etherized, I made a free incision through the skin covering the mastoid process, enlarged the opening in the bone by means of the larger drill, made a new opening a short distance above the old one, and then broke down the intervening bridge of bone. A large and sharply defined cavity, filled with fluid and cheesy pus and several fragments of bone, was found in the unusually large mastoid process. The highest point of the cavity was fully three fourths of an inch above the level of the upper wall of the meatus. It was estimated that the cavity contained at least a drachm of pus. The largest fragment of loose bone removed measured two thirds of an inch in length, and consisted evidently of the peculiar honey-combed structure of the mastoid cells.

10th.—Complete freedom from pain. Appetite good.

11th.—Moderate swelling of the parts surrounding the wound. Patient doing well in every respect.

22d.—Since the last note patient has complained very much of pain in the lower jaw on the right side. There is no redness or swelling in this region, but the jaw on this side is everywhere tender to the touch. On exploring the meatus, I discovered that it was nearly closed by a collect-

ion of pus lying between the upper and posterior bony wall and the skin of the canal. Near the stump of the polypus (removed July 9th) I discovered a small opening in the skin which was apparently the only outlet for this collection of pus. Upon enlarging this opening I was able to press out nearly half a drachm of pus, and one small fragment of exfoliated bone; other small fragments could be felt with the probe, but no attempt was made to remove them.

25th.—Great improvement since last note. Patient eats and sleeps well and is entirely free from pain. On wiping out the orifice of the ear he occasionally finds a small fragment of bone.

September 20th.—I have not seen the patient since the last note, but find him to-day in a very low state. He has no pain in or about the ear, but complains of a "headache" which comes on every afternoon. His general appearance is that of a man in the last stage of consumption. The probe can now be passed, through the opening in the posterior and upper wall of the external auditory canal, upward and backward a distance of fully two inches from the outer orifice, without encountering any resistance. The presence of smaller and larger fragments of bone can be readily distinguished as the probe is pushed along the fistulous track. Sinus in the mastoid region (behind the auricle) still open.

I did not see the patient subsequently, but am confident that he must have died very soon after I saw him.

Case XI.—Female, aged twenty-nine. February 10, 1875. Discharge from left ear since childhood. Of late, considerable pain in the region of the ear and in the left eye. Examination revealed the presence of granulation tissue in the left meatus. It sprang from the entrance of a sinus in the bone, posteriorly and near the middle part

of the canal. Denuded and crumbling bone felt with probe. Slight tenderness over the lower portion of mastoid process, and also in vicinity of the occipital protuberance.

Operation performed on February 13th. Drill applied at the usual spot and carried to a depth of three fifths of an inch. No pus found.

February 14th.—Marked relief from pain.

16th.—Tenderness and swelling of the soft parts in front of and above the auricle. Temperature nearly normal.

20th.—Prolonged attack of syncope since last date. Temperature varies from 98.5° to 99.5° F. Pain in the head is nearly constant. Second removal of polypoid granulations.

24th.—Two convulsive seizures today. Pain referred chiefly to left eye. Her answers to questions are at times almost unintelligible. Profuse sweating. Occasional vomiting.

26th.—She is so restless now that force has to be employed to prevent her from leaving her bed. Constant delirium. Right strabismus has developed, and the right upper lid droops. Temperature risen to 101° F. Death occurred during the night. No post-mortem examination was allowed, but by means of a curved probe I ascertained that an ample communication existed between the middle ear and the cranial cavity. The patient's death was undoubtedly due to abscess of the brain, the result of caries of the antrum, roof of tympanum, and adjacent bony structures.

Case XII.—Male, aged twenty-eight. August 25th, 1875. Ten days previously he contracted an acute inflammation of the right ear, as a result of bathing in salt water. The establishment of a discharge from the ear had afforded little or no relief from the pain. Membrana tym-

pani red, swollen and perforated; mastoid integuments tender on pressure, swollen, and congested. The latter were freely incised.

September 25th.—The Wilde's incision afforded marked relief from pain, but the external wound still remains open at one point; there is still tenderness, and an abundant otorrhœa continues.

October 7th.—Coincidently with a diminution in the amount of the discharge during the past few days, the pain has increased and is now quite severe. Bone perforated with drill and a large cavity found at a short distance from the surface.

16th.—A fluctuating swelling having developed midway between the mastoid process and the occipital protuberance, it was incised to-day and pus evacuated. This pus had collected between the dura mater and the bone.

November 24th.—Both external wounds are still open and both afford escape to pus. By a deep incision I converted these two small openings into a single large open wound. The periosteum was found to be separated from the bone throughout quite a large area.

December 15th.—For the first time since the original operation, the patient has remained entirely free from pain for several consecutive days.

January 15th.—External wound has healed perfectly, and patient is again well in every respect.

Case XIII.—Female, aged thirty-five. March 17, 1876. Acute inflammation of the left middle ear three weeks previously. Profuse otorrhœa followed. Steady increase of pain, which now involves entire side of head. Mastoid integuments tender, but not swollen nor red. Prolapsed condition of the upper and posterior cutaneous wall of the external auditory canal. Wilde's incision.

March 24th.—Sinus found in the bone at the bottom of

the external wound. Bone perforated with drill. Free hæmorrhage prevented me from ascertaining whether pus was reached or not. The antrum was not reached. The pain, however, was relieved, and patient continued to improve up to the middle of April. About that time an acute polyarthritis set in, and patient was severely ill for about two weeks. On the 11th of May she left the city, and about one year later I learned that the ear gave her no further trouble, and that she had entirely recovered her health.

Case XIV.—Male, aged fifty-three. March 29, 1876. Acute inflammation of the right middle ear from exposure to wet and cold. Steady increase of the pain. Mastoid integuments tender; five leeches applied.

April 7th.—Pain only temporarily relieved; now severe again. Redness and swelling of mastoid integuments. Wilde's incision.

19th.—Perforation of bone with drill. Cavity found containing sequestra of bone and thick pus.

22d.—Decided relief from pain.

May 10th.—Discharge from external auditory canal has ceased.

The patient remained under observation at long intervals, until May, 1877. At that date the fistulous opening seemed to be on the eve of healing.

Case XV.—Female, aged fifty. January 5, 1874. An acute inflammation of the left middle ear had developed three weeks previously. Leeches had afforded only partial relief from pain, and the physician in attendance accordingly made a Wilde's incision.

January 15th.—Bone perforated with drill. From the smallness of the external wound and the copiousness of the hæmorrhage, I was unable to ascertain whether the mas-

toid cells contained pus or not. Apparently the antrum was not reached, although the drill penetrated to a depth of half an inch.

While the operation gave the patient entire relief from pain for a period of five weeks, it then returned and continued to distress her, at intervals, for several weeks. A very free paracentesis of the membrana tympani, on March 12th, at last gave her permanent relief. By the 25th of March the discharge from the ear had ceased, the external wound had healed, and patient felt once more perfectly well.

Case XVI.—Male, aged thirty-five. October 29, 1877. Nine weeks previously he contracted an acute inflammation of the right middle ear. The pain gradually subsided, but it returned again about a week previous to the time when I first saw him. Constant discharge. Examination shows the presence of a large fleshy mass at inner end of the canal. Tenderness on pressure over the mastoid process. Wilde's incision and the removal of the greater part of the fleshy mass afforded decided relief from the pain.

Nov. 24th.—Pain is again on the increase.

29th.—Continued and increasing pain. Operation performed. Drill carried to a depth of nearly three quarters of an inch. Cells seemed to be of moderate size and healthy. The septa were quite thick. At the bottom of this opening the probe encountered a pad of soft tissue—probably granulation tissue filling the antrum. No pus found. By probing through the sinus in the vicinity of Schrapnell's membrane, it was learned that the lateral and lower bony edge of the entrance to the antrum was in a denuded and roughened condition.

December 29th.—The operation having failed to afford more than temporary relief, and the granulation growth in the canal having attained sufficient size and firmness of

texture to interfere with the free escape of pus from the middle ear, the patient was again anæsthetized and the granulation growth thoroughly excised.

From this date forward the patient made a rapid and permanent recovery, and by the 15th of January both the external wound and the perforation in the drum-membrane had healed.

Case XVII.—Male, aged fourteen. April 5, 1883. R. ot. med. pur. chron., originating five years previously in an attack of scarlet fever. Discharge intermittent. Pain at times severe since three weeks previously. Temperature 104.5° F. Patient drowsy and apathetic. Examination shows that a sinus in vicinity of Schrapnell's membrane has become blocked or obstructed, and, as a consequence, the discharge is very scanty. Redness and swelling of inner half of osseous canal.

Drill used. Pus found at a depth of three fifths of an inch. Artificial opening in bone syringed with carbolated water daily for several days. On the fifth day after the operation the patient had a severe attack of malarial intermittent fever, which finally yielded to quinine (forty grains per day, for two or three days; afterwards twenty-five grains daily for several days). External wound closed on the twentieth day after the operation. Then, a few days later, it reopened and discharged a few drops of opaque serum. After that it remained permanently healed until about one year later; and again, three years later, when, after catching cold, a small abscess developed in the cicatrix, broke, discharged a little pus, and then the parts again resumed a normal condition. The discharge from the meatus ceased about ten weeks after the operation. During the three and a half years which have elapsed since then the patient has, with the exceptions mentioned, been entirely free from all ear trouble.

Case XVIII.—Female, aged fifteen. May 2, 1883. Ot. med. pur. chron. of right side. Pain in affected ear for several weeks past, and for nearly a week it has been severe. Marked prolapse of posterior and upper cutaneous wall of canal. Incision afforded escape only to pus, without cheesy material. System of most careful douching inaugurated. Little or no relief from the pain. No redness, swelling, or tenderness of mastoid integuments, owing, undoubtedly, to sclerosed condition of mastoid bone.

Operation with drill May 8th. Bone hard, but not excessively so. Antrum reached at a depth of about half an inch. Final opening into antrum only about 2 mm. in diameter. Rich, creamy pus welled up through this opening in the bone, when the patient vomited. Carbolated water used in washing out antrum; later on, boric acid (saturated solution) was used once daily for a few days.

Already, on the day following that of the operation, patient was found to be free from pain. On the fifth day part of the fluid injected into the antrum escaped by way of the external auditory canal. On the eleventh day the antrum injections were discontinued. External wound closed permanently about July 15. Sequestrum of bone removed from meatus on July 19th. Final cessation of the otorrhœa during last week of November, after a lapse of six months from the date of the operation.

Case XIX.—Male, aged twenty. May 14, 1883. Left ear gave no trouble until eight weeks previously, when it began to ache. There were also tinnitus and throbbing. Pain and other symptoms have been intermittent until within past few days, when parts behind the affected ear became tender and swollen, and the pain became severe. Examination shows redness and infiltration of the membrana tympani without bulging; prolapse of posterior superior

cutaneous wall, near the drum-membrane. Redness, tenderness, and swelling of mastoid integuments. Paracentesis of membrana tympani and Wilde's incision, with stuffing of wound.

May 20th.—Patient entirely free from pain. External wound has nearly closed, the tent having been removed a day or two ago.

May 25.—No return of pain. No otorrhœa. Membrana tympani healed. External wound has healed, and there is scarcely any tenderness left.

June 5th.—Dancing-party last evening. Pain in ear returned, and has been severe throughout the night and morning. Three leeches applied.

6th.—Pain entirely relieved. Drum-membrane has lost all evidences of congestion. Still a little swelling of mastoid integuments.

July 9th.—Patient has been very comfortable in the region of his ear since last date until two days ago. Then pain became severe behind the ear, and marked redness and swelling developed in this region.

10th.—Integuments incised behind ear. Pus evacuated from abscess below mastoid process. No sinus discoverable on examination of surface of the bone. Drill reached pus at a depth of one fourth of an inch. Large abscess, occupying entire body of mastoid process. No traces left of the bony septa. Cavity washed with carbolized water. Simple dressings. Pain speedily relieved. No relapse. External wound healed about September 1st, after the lapse of about seven weeks.

Two years later he caught a cold in the head, and a small abscess formed in the old cicatrix. A sinus led from this, apparently, to the old opening in the bone. It healed again in the course of a few days.

CASE XX.—Male, aged twenty-seven. July 20, 1883. Pain in right ear following salt water bathing six days previously. During past four days pain has been constant and severe, particularly so during the night previous. Examination shows that the walls of the right meatus are red and somewhat swollen. View of deeper parts very unsatisfactory, by reason of three or four small exostoses which block the way. Patient spits blood, which seems to come from the ear. Watch heard only on contact. Pulse 84, temperature 100° F. Three leeches applied. Warm douche. Poultices. Patient advised to remain in bed.

July 24th.—Very little, if any, relief from employment of leeches, etc. Mastoid integuments now red and swollen. Auricle slightly dislocated forward. Meatus entirely closed by swelling of its walls. Wilde's incision, followed by poulticing.

25th.—Pain not quite so severe. Temperature 101.2° F., pulse 72. Poultices to be continued.

26th.—Pain in and around the ear severe during the night. This A. M. he has much less pain. There is now, however, a constant pulsation deep down in the ear. Pulse 88, temperature 100.8° F. Poultices to be continued.

27th.—Pain again severe.

29th.—Pain continues. To-day there is swelling of the soft parts in the temporal region. Tenderness and swelling behind the ear are still present, and have perhaps increased. Pulse 94, temperature 100.6° F. Mastoid integument incised, giving escape to pus which seemed to be forming outside of the periosteum. Drill carried to a depth of three fifths of an inch, opening consecutively into two large cells. No pus found.

30th.—Patient slept well. Pain has entirely disappeared. Temperature normal. External wound healed on or about August 20th. No relapse of any kind subsequently.

CASE XXI.—Female, aged ten. September, 1883. Chronic otitis media purulenta, with foul discharge through fistulous opening above drum-membrane anteriorly. Probe passes in freely to a depth of several millimetres. No mastoid symptoms until during the present month. Otorrhœa ceased, and fluctuating swelling developed behind the ear. Incision gave escape to an ounce of fœtid pus. Drill applied at the usual spot. No evidence of bone softening or fistulous opening. Pus-cavity reached at a depth of one third inch. Probe passed to a depth of one inch before meeting any resistance. Syringing of this cavity brought away a large quantity of cheesy and flaky material that had a very foul odor. Syringing continued until water escaped clear. Much of the water and foul material escaped from the external auditory canal during the syringing. Simple dressings.

The following day I found very marked œdema of the left eyelids and temple of a slightly bluish hue. Child rebellious, and no further washings of the bone cavity were permitted.

On the third day after the operation the œdema had almost entirely disappeared. No pain. No treatment permitted except simple dressings and washing of the meatus.

Sixteen days after the operation the wound had healed, and the otorrhœa had ceased.

A few months later she had a relapse. Abscess broke externally. Otorrhœa returned and has continued interruptedly ever since.

CASE XXII.—Female, aged six. November 17, 1883. Acute attack of inflammation of the right middle ear two weeks previously. Yesterday the discharge ceased and the parts behind and above the ear rapidly became swollen. Child very pale. No appetite. Temperature 100.8° F.

Marked tenderness behind and above the ear. Paracentesis of the inflamed drum-membrane performed. The use of douche and poultices advised.

November 19th.—Child complains less of pain. Temperature 101° F. Discharge appeared soon after the paracentesis, but it has now ceased again. Otherwise no material change seems to have taken place in her condition. Poultices and douche to be continued.

23d.—There is now quite a large fluctuating swelling behind the ear. Temperature 101° F. Pain only at times. Incision evacuated about half an ounce of thick pus, which seemed to lie outside of the periosteum. Drill applied at the usual spot; and, at a depth of half an inch, three or four large cells were broken into. No pus seen. Wound in bone douched with carbolized water.

December 6th.—Rapid recovery of strength and appetite since the operation. No return of the pain. No discharge from the meatus. External wound has permanently healed (thirteen days after operation), and the membrana tympani has regained almost a normal appearance.

Case XXIII.—Male, aged thirteen. February 23, 1885. Sharp earache in right ear ten days previously, followed by a profuse discharge. Comparatively little pain since then, but the discharge continues to be profuse. Examination shows that the pus is escaping, not through the membrana tympani proper, but through a pouting orifice in the upper cutaneous wall, a short distance from the drum-membrane. Slight tenderness behind the ear. Temperature 100.5° F. Douche to be used several times daily with a saturated solution of boric acid.

March 1st.—At noon to-day he had a slight chill; temperature 104° F.: pulse 92. The chill was followed by a noticeable increase in the amount of discharge. No increase in the mastoid tenderness.

2d.—Persistent vomiting and retching last evening. Mastoid tenderness more marked to-day; temperature 102.4° F.

3d.—Marked diminution yesterday in the amount of the discharge. He has taken fifteen grains of quinine daily during the past two days. Yesterday he had a profuse sweat. This morning he began to complain of pain in the metacarpo-phalangeal joint of the left middle finger. With the pain was associated a small, well-defined red spot, which gradually spread and soon presented all the appearances of an acute inflammation of the joint. The least movement caused great pain in the part. On inquiry, I ascertained that he had never before had anything like rheumatism. Nevertheless, I put him on ten-grain doses of salicylate of soda every four hours.

4th.—The redness and swelling have not extended appreciably beyond the limits of the knuckle. The pain in the part is already beginning to subside.

6th. Patient passed a bad night, the pain in the right side of the head being severe. It is referred chiefly to the right temple. No redness or œdema of mastoid integuments, but still some tenderness over the upper portion. Caliber of the external auditory canal markedly reduced in size. Discharge still profuse, and now at times a little bloody. Perforation of bone advised.

7th.—He is again feeling better; temperature normal. Patient is given ether, and drill applied at usual spot. At a depth of half an inch the bone appeared to be noticeably softened. On breaking into the antrum, creamy pus welled up to the surface of the bone. In chiseling out the drainage groove I opened into some of the more superficial cells, which were found full of thick pus. In washing out the antrum I used an unusually strong solution of bichloride of mercury (1 to 1,000), and, as a good deal of it passed through the Eustachian tube into the pharynx, it

gave him not a little discomfort afterwards for at least an hour.

Patient made a rapid and complete recovery, the discharge from the meatus ceasing entirely on March 9th, and the external wound healing permanently on or about April 1st.

CASE XXIV.—Male, aged thirteen. January 20, 1886. Contracted an acute inflammation of the left middle ear about December 20th last. Pain, discharge from the ear, and deafness. From that time to the present he has had attacks of pain in the affected ear, alternating with periods of comparative comfort. Recently, however, the pain has greatly increased, and he has now taken to his bed. More or less "stiff neck" of late; temperature has been above normal (101° F.+); paracentesis—the perforation being of too small size—afforded only temporary relief. Last night the pain was severe. To-day he shows decided signs of drowsiness. Examination reveals a profuse creamy discharge from the external auditory canal. Great narrowing of osseous part of canal. Walls red and swollen. Tenderness on pressure over mastoid bone, especially over the lower part. Moderate œdema and redness of skin. Tenderness along course of sterno-cleido-mastoid muscle.

Operation performed with drill. Cells found to be small and septa strong. Antrum reached at a depth of fully three fourths of an inch. Creamy pus welled up. Cavity washed out with a 1-to-3,000 solution of bichloride of mercury.

From the family physician I learned that the external wound did not heal until after the lapse of six or seven weeks. One or two fragments of bone came away. Afterwards perfect healing of wound and of perforation in the membrana tympani followed.

DISCUSSION.

Dr. Samuel Theobald, of Baltimore:—I understand that Dr. Buck does not use a drainage tube.

Dr. Buck:—I do not. I substitute this collateral channel, which is in itself a drainage tube.

Dr. Webster:—How does Dr. Buck know when he has approached sufficiently near to the antrum to change his instrument?

Dr. Buck:—In this paper, I have tried to avoid diverging into a description of the operation in all its details. In reply to the question, I will say that I am guided by measurements. I make it a rule not to carry the drill to a greater depth than three fourths of an inch. The depth is determined by introducing a steel director and measuring the distance to which it penetrates. One of the best guides that the proper depth has been reached is the sensation imparted by the drill. The drill is cone-shaped, so that the point may be in the antrum, while the rest of the instrument is in the full-sized channel. When the point enters the antrum, you are sure to notice that there is some obstacle, that it is no longer easy to rotate the instrument. When this occurs, I stop and examine with a slender probe and so ascertain the exact state of the parts at the bottom of the channel. It remains to break down in a safe manner this intervening portion of bone. I do this by means of a steel burr, such as is used by dentists, and also by aid of one of the smaller drills. Dr. Green has another procedure to suggest.

Dr. Agnew:—Will the speaker tell us his method of irrigation, and how frequently he applies the bichloride solution?

Dr. Buck:—I do it by means of a slender nozzle introduced into the antrum as one of the last steps of the operation, and in a comparatively imperfect manner. The

irrigation is repeated in the course of eight or ten hours. I then do it once a day during the following five or six days.

Dr. Webster:—I asked Dr. Buck how he knew when he was approaching the antrum because in a few cases in which I have seen the mastoid bone opened, the distance which the drill or the chisel had to traverse before reaching the cells varied exceedingly. Sometimes it was not more than one fourth of an inch. In another case in which Dr. Emerson did the operation, the distance was over an inch. In Dr. Roosa's book a case is published in which the distance was an inch.

Dr. Buck:—Dr. Webster suggests several points. In my earlier articles I described an operation performed on a different basis from that which I now adopt. When the wound is opened, you may imagine before you a triangle, the apex of the mastoid process being the apex of this triangle and the upper broad part the base. I was in the habit of mapping out this triangle, running a vertical line through the centre of it, and then applying the drill one fourth to one half of an inch in front of that and just below the level of the upper wall of the meatus. In this situation you may in some cases get an artificial channel of such length as to measure one inch from the surface of the bone to the antrum.

My present plan is different. I make a long, straight incision in the usual place. In four cases I tried a curved incision, the curve looking forward. It worked beautifully so far as my convenience was concerned, but in every case there was, after the parts had healed, a little displacement of the auricle downwards, which was an objectionable feature. I have abandoned that plan in the interest of the patient's good looks. By making quite a long vertical incision, say three inches in length, I can get sufficient relaxation of tissues to enable me to expose the mastoid proc-

ess where it curves into the meatus. This affords me a fixed guiding point. I then apply the instrument on the first flat region lying back of the meatus, and at such a point as to bring the contemplated artificial channel below the upper bony limit of the meatus. Such a channel, carried directly down to the antrum, will rarely measure over three fourths of an inch in length. In cases of hyperostosis of the mastoid process, this channel might have a length of one inch, but I have never encountered such a degree of hyperostosis. I am therefore inclined to believe that the extra quarter of an inch occasionally observed, is due to obliquity of the canal. I think that I can almost absolutely guard against the drill going where it should not go.

The only difficulty is in establishing the final communication between the canal and the antrum. I believe that the object in all these operations should be to reach the antrum. In this way I think that we obtain the most perfect drainage. I have attempted to carry out Dr. Sexton's suggestion of going through the posterior superior quadrant of the membrana tympani and have always regretted it. Any serious instrumental interference with the parts at this point is apt to set up so much congestion and inflammation of the parts, that in twenty-four hours this route for the drainage will be closed. Reopening it may excite further inflammation, and perhaps even inflammation of the brain.

Dr. Agnew:—When Dr. Buck says that a case is cured, I suppose that he means that the urgent symptoms for which the operation was undertaken are relieved, not necessarily the removal of the suppurative otitis.

Dr. Buck:—I adopt the basis of Schwartze. Not only must the urgent symptoms be relieved, but the discharge must be stopped.

Dr. J. Orne Green:—Dr. Buck has wisely confined himself to the question of the drill against the chisel. In

my own practice, I have used the drill almost entirely, except once or twice when I wanted to remove little prominences, which has nothing to do with the question which he raises. I agree with him in the points which he has mentioned, but it seems to me that in this operation there are one or two points which might be mentioned where we should differ. In regard to the size of the opening. In a paper which I have written for a book which Dr. Buck has edited, I state that I prefer a moderate sized opening, on account of the smaller wound, the smaller cicatrix and for other reasons. Having made the opening I am guided by what I find, in my decision whether or not to make it larger. Some cases, as Dr. Agnew stated, require very large openings, and in the article to which I have referred I state that probably the chisel and the gouge will come into play where a large opening is required. Where a smaller opening is required the drill serves the purpose.

The conditions found inside should determine the size of the opening to a certain extent. Where you find pus, carious matter and softened bone, and you have reason to think that a cure will result from cleanliness, drainage and antiseptic irrigation, a large opening is not needed. If, on the other hand, you find that part of the bone although diseased, is not yet softened, the treatment is liable to be long continued and a large opening is required. Possibly a small opening may in these latter cases become closed too early. I agree with Schwartze that it is better to keep the wound open a week too long, than to let it close a day too soon. In the majority of cases you can get along with a small opening and I prefer the drill to the chisel and gouge.

Dr. Buck speaks incidentally of the rules of the operation being well established. I wish that they were, or I wish that the general surgeons would look at this operation as they do at any other operation and would attend to the

rules for performing the operation. Twice in the last ten years have I seen the lateral sinus perforated with fatal results, by admirable surgeons who did the operation quite regardless of any rules, the bones being without malformation. They seem to treat the operation as one which may be done on general principles, without regard to the particular steps of the operation.

The method which I wish to suggest and one which is very applicable in some of these cases is the use of the dental engine. Some years ago after the cases reported by Dr. Mathewson and some cases in England, I became interested in the matter. I wished several times to use the engine, but on talking with dentists I found that they all acknowledged that a certain expertness was required in the use of the foot. An inexpert foot is apt to suddenly reverse the engine and throw the burr out. I once or twice made arrangements for an expert man to come and run the engine, but I found that it was with difficulty that I could arrange my time to suit the expert, and I had not time to make myself an expert. I spoke to my dentist about the difficulty and he suggested that I get the apparatus which he used when he had to go away from his office, a dental engine made to run by hand. The few times which I have used it, it has given perfect satisfaction. It gives a dental engine which can be screwed to the table and can be run by any one.

The advantages of the dental engine are very great in the rapidity of cutting, etc. It is not necessary to refer to them. The burrs can be honed so as to have a delicate cutting edge. With this instrument you can make the most delicate cut. The engine will, I think, eventually come into general use in these cases, especially where you want to remove carious masses deep in.

I might refer here to a case in which I operated on the mastoid. Six months later it became necessary, on account

of caries, to do something further. The disease had existed some twenty or thirty years. It seemed to me that the only things to be done were either to make a large opening and chisel out the bone, giving a large traumatic surface, or to use the dental engine. I decided on the latter course and was delighted with the way the instrument worked. The burr could be passed down and swept all about and in an operation lasting only three fourths of an hour all the carious bone at a depth of more than five eighths of an inch was cleared away, and from the rapidity of the cut, this was more thorough than could have been accomplished with any other instrument. The case made an admirable recovery. I have as yet used the drill comparatively little, but it seems to me that it will be useful for removing little spots of caries in the tympanum and over the promontory. There is no trouble about the delicacy of the work. The drill is held as a pen and by resting the fingers on the head it may be held steadily. The only improvement that I would suggest would be a larger wheel, whereby more power could be obtained.

In regard to drainage tubes, in the cases which I have operated on, I have put in a drainage tube and kept it in as long as possible. When possible, I use a straight drainage tube and try to make the opening straight. If necessary I make a second operation.

My plan of dressing has been about the same as Dr. Buck's, except that I have used a carbolic acid solution, (one to eighty) and douched the wound with this twice a day. For the past two or three years I have applied the antiseptic gauze dressings and have kept them on.

There is another point I am glad to see him make, that is, that the antrum should be the objective point of the operation.

Dr. Knapp:—I wish to make some remarks in favor of the chisel. In, my first operations, I used the drill, but

gradually have abandoned it and given the chisel decided preference. The advantage of the chisel lies in the fact that at every step of the operation you can satisfy yourself of the nature of the tissue before you. On the whole, on opening the mastoid, we meet with four varieties of bone: (1) very compact, ivory-like substance, (2) more vascular, less dense bone, in a state of simple inflammation, (3) a cavity containing pus, and (4) caries and necrosis, with sequestra. It is important to recognize all these conditions during the course of the operation, and guide our further steps accordingly. This cannot satisfactorily be done by boring a hole into the bone, which even at slight depth is dark. The chisel and the perfectly smooth wound made with it can more easily be kept bacteriologically clean than the drill and the canal it forms. Wound infection is therefore less likely to occur after chiseling than after drilling of the mastoid.

Dr. Henry D. Noyes, of New York:—There is less danger in the use of the chisel than in the use of the drill. I refer to the risks which attend operations on the mastoid as a result of irregularities in the anatomical relations of the parts. The lateral sinus is not always found in the same place. If a perforating instrument like a drill is employed there is a liability of perforating the wall of the sinus or of some important vein. If you make use of the chisel or gouge, you explore the bone, layer by layer, and ascertain how the parts are situated.

I shall never forget the impression made upon me by a specimen shown me by Professor Lucae, of Berlin. It was a specimen taken from a subject who had died of acute trouble of the ear, where the Professor had performed the operation on the mastoid with the chisel and had laid bare the whole exterior surface of the lateral sinus without wounding it. The autopsy fully justified the operation which had nothing to do with the fatal termination. The

lateral sinus lay in such a position that it inevitably intruded itself in the operation. This case was a strong argument in favor of the use of the chisel.

Dr. Andrews:—It was my intention to introduce this subject, but when I found that Dr. Buck was down for a paper on the same subject, I transferred my scene of action to another place.

Among the cases in which I have operated on the mastoid, fifty-two in number, I have perforated the bone in twenty-six. I have never had occasion to regret having done the operation, even in the fatal cases which I detailed to this Society two or three years ago. In some of the cases I did not find any pus. I have always used the chisel and have always begun with the drill. I believe with Schwartze that the chisel is the best instrument and can be used with more precision than the drill.

I always make a large opening, because I have constantly in mind the surgical principle that any collection of pus in the body should be given free vent. Instead of the ordinary drainage tube, I have used a small rubber gutter, which I employ principally to separate the soft parts and prevent them from interfering with drainage.

Of the amount of chiseling which can be done about the skull, without injury to the brain, I had a typical illustration two years ago. I was asked by a well known surgeon of New York to see with him at one of the principal hospitals, a case of suppurative middle ear disease with severe headache. On examination of the eye, I found swelling of the optic disc which I considered indicated an intracranial complication. The ear had stopped discharging for two or three days and the patient complained of severe headache. I considered it proper to operate on the mastoid. The surgeon used the chisel, perforating the bone to the dura mater which was exposed over a surface one fourth of an inch in diameter. Very little pus was found.

The operator was not satisfied and introduced a hypodermic needle through the dura mater. No pus was obtained. A large incision in the dura mater was made but no pus escaped. The patient died in three or four days. This case illustrates how one can go into the bone with a chisel without inflicting injury on vital parts, although there was, of course, no justification for inflicting injury upon the dura mater, nor even for exposing it as was done.

Dr. Gruening, of New York:—At the meeting three years ago, I stated that I had probably perforated the mastoid sixty times. When I went home I found that I had operated sixty-two times. Since then I have perforated the bone fifteen times, making in all seventy-seven. When I began to operate, I used the instrument of Dr. Buck and in acute cases my success was all that I could desire. Where there was pus, it was discharged. At that time we had no bacteriological considerations. The wound was washed and in all acute cases the result was satisfactory. In one case, however, where I had used the instrument, I found that the whole mastoid process was filled with broken down bone, gritty substance and cheesy material and that it was impossible to remove these matters through the small wound. I then looked for another instrument and with a carpenter's chisel opened the mastoid and removed these matters. It required four months for this wound to heal and there was a marked cicatrix left. I could not have cured the patient without this operation. I then had a set of the Schwartze's chisels sent me. A small opening can be made with the chisel if desired. Since then I have employed the chisel exclusively and shall never return to the burr or drill. What I can do with the drill, I can do with the chisel and what I can do with the chisel I can not do with the drill.

Dr. J. A. Lippincott, of Pittsburg:—I would ask the advocates of the chisel whether they find it necessary

to use a mallet. In one case where the mallet was employed, I thought that there were signs of concussion.

Dr. Knapp: — In reply to Dr. Lippincott, I will say that I always use an ox-hide mallet. If the force is properly applied, you can hammer for a long time without causing any injury.

Dr. Agnew: — In employing the mallet, a good deal depends upon the angle. Any one who has had a tooth filled with a plugger, by which a blow is discharged upon the filling by means of a spring, will know that it is very fatiguing to the brain, much more so than where the ordinary method by pressing the filling in with a tamping instrument is employed. Some restriction must be employed in striking these blows on the chisel. It is important to use the chisel in a direction from the cavity of the skull, downwards towards the apex of the mastoid, and thus the blow on the chisel glides off, as it were, and is not communicated to the brain.

The first time I opened the mastoid was thirty years ago. I did it with the trephine. This is objectionable because the button of bone is hard to remove. I next did the operation with a common quarter inch gimlet. I next used the drill of my colleague on the left (Dr. Buck), which was a great advance on anything before presented. I have lately used the chisel and I think on the whole that this is the best method, although I have not had the experience of opening the mastoid sixty or seventy times.

Dr. Buck: —From the direction which the discussion has taken, it might appear that I am in antagonism with the chisel. I have tried to say in my paper that I am not in antagonism with the use of the chisel in those cases where there is a large surface of bone to be removed. I leave those cases out of consideration in my paper. Where a large mass is to be removed the drill cannot remove it. The two instruments cannot come into conflict in such cases.

ON PAINLESS AND ONLY SLIGHTLY PAINFUL ULCERATION AND PERFORATION OF THE MEMBRANA TYMPANI, PROBABLY OF A TUBERCULAR NATURE.

By Albert H. Buck, M. D., *New York, N. Y.*

During the past year I have had under my care three cases, in all of which I have reason to believe that the disease presented to my view was tubercular in its nature. Tuberculosis, I need scarcely remark, is a prolific source of purulent affections of the middle ear. The part which it plays in these cases is well known to aural surgeons, and it would be like bringing coals to Newcastle for me to say anything on this general topic in this place. But the recognition of the earliest stages of tubercular disease of the ear is another matter, and the object of the present brief paper is to call the attention of the members of this society to what seem to me to be the peculiar features by which we may distinguish a tubercular from a simple inflammation of the middle ear.

In all three of the cases referred to above the patients were in fair general health. They were certainly not robust, but nobody would for a moment think of speaking of them as presenting the appearance of delicate health. One of them had been subject to almost constant backache for a few months previously, but the significance of this pain (disease of the spinal vertebræ) was only discovered a short time before she consulted me on account of her ear. So far as I could learn, there was no evidence of present or previous pulmonary disease in any of the cases.

In all three of them tinnitus and a sense of fullness in the ear, together with slight impairment of the hearing, were the first symptoms noticed. In two of the three cases I had repeated opportunities of examining the parts with the mirror and reflected light from the earliest commencement of the disease. In the third case I was not consulted until after the patient discovered that his ear was discharging. Slight redness and infiltration of the upper part of the membrana tympani, chiefly posteriorly, and of the skin covering the bony wall of the canal in the immediate vicinity, were the first changes observed. In the course of several days, in one case, and of a few weeks in the other, the infiltration and congestion spread downward until the entire posterior superior quadrant was involved. Gradually, after the lapse of a few days, this region became convex toward the eye of the observer, as if some semi-fluid material were accumulating on the inner side of the membrana tympani. Finally, without any pain, or with a sense of fullness and discomfort barely amounting to a sense of pain, at the most prominent part of the bulging portion, a perforation established itself, as if by a melting away process at this spot. From this time forward the disease pursued a somewhat different course in each of the cases. In one of them the redness and infiltration spread rapidly from the posterior superior quadrant to the rest of the membrane. The same thing probably took place in the case which I did not see until after the discharge had been established. In the third case, however—that of the young girl with spinal disease—the redness and infiltration did not spread to the other portions of the drum-membrane; but, on the other hand, the upper and posterior portion of the wall of the canal gradually became more markedly congested and infiltrated, as if the bone itself—that part which constitutes the floor of the antrum—were the chief seat of the disease.

Finally, I will state briefly the subsequent histories of

these cases. In the one to which I have last referred the ear gradually improved so far that the only lesions left were a little redness along the upper wall of the bony canal and a scab-like formation covering the site of the perforation. The hearing in this ear was also slightly impaired. In the other two cases the discharge increased in quantity until it became profuse. Then obstructions to the free escape of pus developed, and the patients experienced a great deal of pain. In one of these two cases a sudden hæmorrhage from the lungs announced the development of tubercular processes in that region; in the other, the general health became so wretched that the patient has since been obliged to spend the winter in a milder southern climate.

Conclusions.—I am disposed to consider the following as the distinguishing features of a tubercular inflammation of the middle ear, in its incipient stages: 1, *the tendency to localize itself in the vicinity of the upper and posterior portion of the membrana tympani*; but whether the disease originates in the tympanic mucous membrane, in the fibrous structures of the membrana tympani, or in the bone of the immediate vicinity, I am still unable to determine, although I suspect that in some cases the bone substance is the starting-point of the disease; 2, *the marked insignificance of the pain, or even its entire absence;* and 3 (a point to which I have called attention in a previous publication, but which was observed in only one of the cases here referred to), *the intolerance of any but the simplest and gentlest local remedial measures.*

During the preparation of this article I received the following note from Dr. Clarence J. Blake, of Boston, with permission to publish it if I so desired. It affords me great pleasure to be able, in this unexpected manner, to furnish such strongly corroborative evidence of the correctness of the clinical picture which I have attempted to draw. But Dr. Blake's communication does more than this: it fur-

nishes additional new data which serve to complete the picture, and it suggests an explanation of the preference shown by the disease for the upper region of the tympanic cavity. The communication is as follows:

July 10, 1886.

DEAR DOCTOR: — I note title of your paper announced, and am very sorry that I can not be at the meeting in New London.

I have had several cases of purulent inflammation of the middle ear accompanying pulmonary tuberculosis and characterized by the following symptoms:

1. Painless course of the inflammatory and destructive process which occurred in the upper portion of the tympanic cavity, beginning with congestion of the inner end of the external auditory canal and membrane of Shrapnell and circumjacent region, followed within forty-eight hours by œdema of the parts mentioned, ulcerative perforation of the membrane of Shrapnell, rapid sloughing, and free purulent discharge.

2. But two of the cases were examined for bacilli in the discharge from the ear, and in neither case were bacilli found.

A markedly illustrative case was that of a young man, twenty-eight years of age, with decided symptoms of pulmonary tuberculosis of the right lung; previous to my examination he had had a sense of fullness in the right ear, impairment of hearing and tinnitus aurium, but no pain, and these symptoms had been followed by a profuse purulent discharge, which, on examination, was found to be escaping through a perforation in the membrane of Shrapnell. A week later he complained of a sense of fullness and of impairment of hearing in the left ear, and I was enabled to watch the destructive process above mentioned, which, within four days, resulted in a free purulent discharge from that ear also. From this implication of the left ear also in this characteristic manner I was inclined to give an unfavorable general prognosis, which was confirmed by the rapid sequence of symptoms in the left lung and by the patient's death a few weeks later.

For this, as in similar cases, I think it probable that the initial impulse to the implication of the middle ear, which occurs in the great majority of the cases which have come under my observation in the upper portion of the tympanic cavity primarily, come from suspence of vaso-motor inhibition, reflexly from the trouble in the lung, in that tract supplied largely by the tympanic branch or branches of the carotid, rather than, as Habermann* supposes, primarily from infection from the sputa.

Sincerely yours, CLARENCE J. BLAKE.

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* "Prager med. Wochenschrift," No. 6, 1885.

DISCUSSION.

Dr. Sexton:—We all see many of these cases of acute catarrhal inflammation of the middle ear in connection with the phthisical tendency. I have not myself noticed, however, that the attic of the tympanum was especially liable to be inflamed in phthisis. I have noticed, as every one has, the susceptibility of the upper ear tract to catarrhal inflammation in phthisical persons. The tendency of the structures of the ear to break down in advanced phthisis is very great.

Dr. Gruening:—I have seen a number of cases of this kind, cases in which I was led to infer that the ulceration of the drumhead was due to tuberculosis. Several cases I recall, in which the tuberculosis in the lungs was far advanced. I have in mind three cases. In the first case, that of a young man, only one ear was affected. The ulceration was in the infero-posterior quadrant of the drumhead. There was very little purulent discharge. There was infiltration of this quadrant, diffused redness and two openings, which showed that this was not a case of perforation from accumulation of matter in the tympanic cavity, but really a melting process. In one of the other cases I noted multiple openings, so that the membrane was honey-combed. These also were in the membrana tympani proper. I have never seen a case of otitis media in a phthisical person in the special region described. These cases are apt to improve by treatment, such as disinfection with weak solutions of bichloride of mercury or pure boracic acid. In several cases the infiltration disappeared, but the openings remained.

Dr. Agnew:—I have been much interested in the picture drawn. The paper is marked by that calm judicial method with which we are familiar in the work of Dr. Buck. I have seen a number of cases, the origin of which

I supposed to be tubercular. If my recollection serves me, although one's recollection is not very reliable away from his note-book, a considerable number of these cases have shown the main lesions in the drumhead below the extremity of the handle of the malleus.

I recall a case of this kind where a young man with trouble in the top of both lungs with loose cough (tubercle in the second stage) came under observation. He stated that he did not remember having had any trouble with the ears, but that two or three days before, he began to have some ringing and a sense of dullness in the ears and then accidentally when blowing his nose, he found that he whistled out of one ear. I found on examining the ear complained of that a portion of the drumhead was gone, looking as though it had been removed with such a punch as gun-wads are made with. The opening was somewhat elliptical in shape. In a few days the same thing occurred in the other ear. The opening here was also elliptical and the edges rounded. There was a little redness running down over the malleus. The striking feature about it was that a kind of liquefaction had gone on in the drumhead, which seemed to be analagous to the process going on in the lungs. I suppose that there had been some defective tissue building in the drumhead mucous membrane previous to this time and under some little irritation as violent coughing or blowing of the nose, the balance had been disturbed and the wasting had gone on and there was this necrotic process without discharge. In most of the cases of perforation of the drumhead from tuberculosis, there has rather been a tendency to absence of discharge.

Dr. Andrews:—In connection with the finding of the bacillus tuberculosis in the purulent discharge from the middle ear in phthisis, I may say that although I have examined a number of cases, and particularly five or six with a great deal of attention both by the microscope and

by culture tests, I have never found the bacillus in question in the discharge from the ear occurring in phthisis. I have not found the bacillus in any of the cases in the Charity Hospital, New York, the majority of whom are in an advanced stage of phthisis. I know, however, that the bacillus tuberculosis has been found in the discharge from the middle ear occuring in phthisis, but it does not occur in all cases.

Dr. Webster:—I would ask the reader of the paper whether he considers the absence of the bacillus an absolute proof that the disease is not tuberculosis of the drumhead, in other words, is the tubercle bacillus essential to the diagnosis of the tuberculosis anywhere?

Dr. Buck:—I cannot throw much light upon the question asked by Dr. Webster, for I have had no experience. I am not in the habit of searching for the bacillus in such cases, probably because such work requires a good deal of time. I should not think that the failure to find the bacillus would exclude tuberculosis, for the opportunities for it to escape detection are too numerous.

I should like to make one or two additional remarks. I have seen cases like those mentioned by Dr. Agnew and one like that described by Dr. Gruening, although not so striking in character as the latter. I have feared to build any picture upon these cases. I drew this one simply as something tentative, with the expectation that some one may knock it down, show its incompleteness or incorrectness at any time. I wanted to set up such a tentative picture, so that we might get at some established facts. In the cases just referred to I may say that I did not see them before the actual establishment of these perforations, and I was therefore unable to exclude the possible pre-existence of the latter in former years, as the result perhaps of some other cause than tuberculosis.

It may be a fact that the tubercular process may start in

any part of the drum-membrane or of the external canal. I have entertained the thought that as in spinal disease the affection frequently starts in the bone, why may it not equally well start in the bony floor of the antrum? This it seems to me is the most likely place for it to start.

Dr. J. Orne Green:—I have been much interested in this discussion. I recognize in the description several characteristics which I attach to tuberculosis. As regards the absence of pain, that I have noticed very markedly. Where I find destruction without discharge and coming on without pain, I suspect the existence of the tubercular diathesis and generally obtain such a history.

Another point which I can confirm is the way that this acts under treatment. Only the mildest measures are effective. Strong astringent applications or strong solutions of nitrate of silver will only make the trouble worse. I warn the patients against irritation and then treat them in the simplest manner. I use powdered boracic acid, wiping the ear without syringing usually, although the syringe is occasionally necessary for perfect cleanliness.

Twice it has occurred to me in advanced tubercular phthisis, with slight ear symptoms (no pain, slight fulness and uneasiness of short duration), in examining the ear, to find the drumhead appear perfectly normal with the exception of one little white glistening point, about the size of a pin's head, not secreting at all, with slight congestion in one case and no congestion in the other. Both of these cases were watched and in both in a few days the white spot disappeared without any discharge, leaving a little punched out hole in the drum-membrane. It seemed to me that I was dealing with isolated tubercles of the tissue of the drum-membrane. One of these cases died three or four months later of the general disease. I do not know what became of the second case. The holes remained as they appeared immediately after the perfora-

tion. There was no congestion, no eversion and not the slightest attempt at repair. I did not encourage the patients at all, but merely cautioned them against exposure.

I should be glad to know if others have observed anything of this kind. It is spoken of in a few of the books.

FATAL TERMINATION AFTER CHISELING OF THE BONE IN A CASE OF SCLEROSING MASTOIDITIS.

By H. Knapp, M. D., *New York, N. Y.*

It is well known that trephining or chiseling a sclerosed mastoid process affords relief, and often cures the disease, even when no pus is encountered. I have observed and published several such cases in my own practice. The operations having been all successful, I consider it my duty to communicate an unfavorable experience, though I cannot ascribe the lethal issue to the operation alone. The fatal termination may have been hastened by the operation, but I think it was unavoidable. The case is as follows:

On Dec. 3, '84, a gentleman, T. R., 50 years old, of New York city, was taken to my office by Dr. Minor. He had suffered from ear disease and was very hard of hearing since he had had scarlet fever in childhood. The right ear was totally deaf, in the left he had quantitative perception of the voice and he could hear the tuning fork from the mastoid. Close to the upper end of the auricle there was a crater-shaped depression in the mastoid process, being the orifice of a cavity fully one inch deep, its diameter varying in different depths from two to six lines. The cavity, smooth everywhere, and not painful to the touch of a probe, was lined with healthy skin, which adhered immovably to its bony support. There was no secretion from it, nor had there been for many years. The cavity

had existed since his youth. A physician opened the skin at that place. Further information could not be obtained. Evidently there had been extensive caries and exfoliation of bone.

There was no drumhead in either ear. The inner wall of the right tympanic cavity was dry and sclerosed, that of the left was free from discharge, red, but not swollen. The deafness in the right ear was old, that of the left was produced by a sudden attack of dizziness six weeks previously. Before that time, this ear had been hard of hearing, but the patient was able to converse with people.

I tried the insertion of moistened cotton pellets in both ears, but without effect.

Three weeks later I saw the patient again. Facial paralysis had appeared on the left side two days previously. There was no discharge from the ear. I advised to steam the ear several times a day and to take large doses of iodide of potassium. The patient felt relieved under this treatment and the facial paralysis was cured in two weeks.

He was brought to my office again on Jan. 29, 1885. He had been better, but during the last week he had had intense headache and nausea. The mucous membrane of the left tympanic cavity was red, but not swollen. No bulging of posterior wall of ear canal; no swelling or painfulness in the mastoid region. The disease was diagnosticated as sclerosing mastoiditis interna and chiseling into the bone was advised, not in the expectation to find pus, but to give relief.

The operation was performed in the afternoon of the same day, (Jan. 29th). An opening, half an inch deep, was chiseled into the mastoid process, just below the cavity mentioned before. The outer table proved to be of compact bone of about three lines in thickness. At a greater depth the bone tissue was less dense, very vascular, and the probe penetrated into several shallow and very

narrow sinuses, remnants of air cavities. A larger one was directed straight forward, corresponding to the antrum, but the probe could not be passed through it into the ear.

The patient found no relief from the operation. He was sleepy the first two days after the operation. His urine had to be taken with the catheter. The third day he was difficult to arouse. He died Feb. 4th, in a comatose condition. It was impossible to obtain permission to an autopsy.

Remarks.—I think there is no doubt that the patient died of meningitis. It followed so immediately after the operation and its course was so much like that of many fatal operations on the skull in which the autopsy discovered meningitis, that the case just reported can fairly be considered as one of *traumatic meningitis*.

Was it proper then to operate?—The fatal issue in this particular case proves that it was not.

Is it improper to operate on sclerosing mastoiditis in general?—In my previous cases the operations have been followed by no alarming symptoms and the results have been most gratifying.

When, then, is this operation indicated, and when is it not?—It seems to me that it is dangerous to operate on patients where it is likely that old suppurative disease has locked up foci of old, decomposed pus. When, either spontaneously or by a traumatism (which need not even cause a wound), such old deposits are stirred, they are very apt to awaken an acute and intense suppuration. Confirmatory examples of this proposition I could cite in my own experience, from the nasal and orbital cavities, the frontal sinuses and the interior of the eyeball. If we take it as a rule that the prognosis is good in cases of sclerosis from catarrhal and plastic inflammation, but bad in sclerosis consequent upon former caries and necrosis, there will be cases on the borderline. In such the indications may

be strong by the presence of cerebral symptoms, although the prognosis be doubtful and even inclining to the bad, for of the otherwise fatal cases the operation may rescue a certain number. The above case falls in this class. Long degenerative disease had prepared a bad soil, in which, on the one hand, it was dangerous to operate, but from which, on the other, the disease was spreading into the cranial cavity. On the strength of our knowledge of such cases it seemed legitimate to assume that the derivation, the depletion, and possibly the liberation of pent up secretion, might have turned the fatal course of the disease.

A CASE OF ABSCESS OF THE MASTOID CELLS WHERE THE MAIN INDICATION FOR OPERATION WAS ELEVATED TEMPERATURE.

By Oren D. Pomeroy, M. D., *New York, N. Y.*

Arthur Shields, æt. 20, a fairly robust man, was attacked by a violent suppurative otitis in the right ear on January 30th, 1886, at 6 P. M. By the next morning there was a free discharge from the ear. On Feb. 1st he entered the hospital, when there was profuse discharge from the ear. The perforation whistle was easily elicited. The perforation was large and readily seen on inspection. There being pain a leach was applied to the tragus, the warm douche was used and the pain was much relieved. A poultice was also used.

Feb. 4th, warm douche used four times a day; membrane looking almost normal; some pain in occiput. Temperature at 3 P. M. $103\frac{3}{5}°$, pulse 88, some tenderness over mastoid but very superficial. H. D. w $\frac{c}{40}$ slightly improved by inflation. Quinine, grs. x, pot. bromid. gr. xx, two doses at intervals of three hours; temperature had promptly fallen to $101\frac{3}{5}°$ by 10 P. M.; Feb. 5th, pain in head much better, very little tenderness over mastoid. At 2 P. M. temperature again rose to 102°, pulse 80. By this time it was apparent that a purulent process was going on, and a consultation was called. There was at this time no swelling of the mastoid and no tenderness except that which might come from a neuralgic condition, that is, pressing upon the part, percussion or even quietly pulling the hair covering

the mastoid caused the patient to wince. There was a very little pain in the occiput. Of the four medical men who were called in consultation one was in favor of cutting down on the mastoid, two were opposed to any operation, but admitted the gravity of the situation, and one advised opening into the mastoid cells. I felt that pus was concealed *somewhere:* the time was too short it seemed to me for a purulent process in the cerebellum, and that it was much more likely to be in the mastoid cells, and I decided to operate. The patient was accordingly etherized and a T shaped incision was made, enabling the mastoid to be well uncovered, when it was found to be free from any signs of disease. The smaller sized Buck's drill was placed upon the mastoid a little more than half an inch from the meatus, directly behind. The external table was readily perforated and so far the cells were healthy and nothing was found, but on boring a couple of lines further a cavity was found from which was discharged from four to six drops of thick pus. Before the drill was used, blood welled up from the meatus in considerable quantities, which even could not be kept out of the canal by frequent wiping with absorbent cotton: this did not seem easy of explanation. After the drill was removed a probe was passed three fourths of an inch forwards and upwards.

Feb. 6th, the patient had slept well and feels much better. The anxious and somewhat distressed expression of countenance which suggested to my assistant, Dr. Hepburn, the propriety of using the thermometer, had entirely disappeared. On the evening of the operation the temperature had fallen to 101°. The wound was kept open and irrigated twice a day with hydr. bichlor. 1 to 6000. The same wash was used in the meatus. There was no passage of fluids from the mastoid cells to the tympanum, although efforts were made to send it through.

Feb 7th, had a good night and the temperature was further reduced; was able to sit up for a while, when the temperature rose slightly but again fell on lying down.

Feb. 8th and 9th. No material change except the temperature had become normal.

Feb. 14th. Discharge ceased, membrane healed; the fistulous opening in the mastoid filling up. The tent in the mastoid was omitted.

On Feb. 26th the fistulous opening was washed out with Anel's syringe and the bichloride wash. He was discharged on March 8th.

The fistulous opening in the mastoid was completely healed two weeks after this date.

The point in this case worthy of attention is the indication for the operation. I am sure that the operation would not have been done had the temperature been normal. The case had progressed in a most usual manner; the membrane had promptly perforated, discharge was free, inflation easily accomplished and the pain had promptly subsided. The tenderness about the mastoid was not sufficient to warrant operation and the pain in the occiput had so far subsided as not to furnish an excuse for opening into the mastoid cells.

DISCUSSION.

Dr. Sexton:—At the New York Eye and Ear Infirmary, we see a great many cases suffering with acute purulent inflammation of the middle ear, the result of exposure. Within the past six months Dr. Noyes has introduced the electric light which gives us much better illumination and we are able to examine the ears of the patients more satisfactorily than ever before. The conditions of the inner end of the external auditory canal and the membrana flaccida being thus so much more readily recognizable, it has now

become my practice to operate much earlier than was formerly practicable. In these cases of acute purulent inflammation with severe symptoms, it is seldom that it is found necessary to make Wilde's incision for periostitis externa, since the relief following an operation on the membrana flaccida, and perhaps including neighboring parts, has almost always, when made early, arrested the progress of the disease. Of course where caries of the cortex has already taken place as a result of the periostitis externa a free incision should be made without delay.

Dr. Pomeroy:—I would ask Dr. Knapp the exact indication for using cotton for the purpose of producing the effect of an artificial drum-membrane? I had supposed that in these cases we had as a rule one of the following conditions: a perforated membrane which we wanted to close, ossicles which had separated and would bear closer coaptation, or a stirrup which was perhaps not accurately fitted to the round window and we wished to produce a more perfect conducting medium. I can not exactly see the indication for the use of an artificial membrane in Dr. Knapp's case.

Dr. Knapp:—All have noticed cases of sclerosis of the middle ear in which the hearing is improved when suppuration is produced. The previously dried up membrana tympani secundaria is made to vibrate again. The cotton-pellet artificial drumhead produces so much moisture that the parts can vibrate. When there is a sclerosing condition of both ears I always try it, and in a number of cases have obtained satisfactory results. To moisten the cotton-pellet, I use one part of glycerine to four of water.

Dr. Gruening:—Did Dr. Knapp's patient die with the symptoms of meningitis? Is it not possible that the man died of Bright's disease? The symptoms were such as we sometimes see in these cases after etherization. Is it not possible that the operation had nothing to do with the con-

dition, and that the result would have been the same, if the man had taken ether without operation? I see nothing in the operation which would cause meningitis.

Dr. Knapp:—I think that the urine was examined, but of this I am not certain. One circumstance that makes me think that the kidneys had nothing to do with the result is the facial paralysis. He had attacks of dizziness two months later. Afterwards, he had intense headache and nausea, quite frequent symptoms in chronic osteitis at the base of the skull. When an operation is performed in these cases, the patients are apt to die comatose in three or four days. Only recently I have published such a case, where the autopsy showed the presence of meningitis. This case is not at all an isolated one.

Dr. Gruening:—In the cases to which Dr. Knapp has alluded there were openings which led into the brain and there was a great deal of suppuration. In the case reported, there was no suppuration and there was no communication with the cranial cavity. The analogy does not seem to be perfect.

Dr. Knapp:—With a few happy exceptions the cases of exostoses in the frontal sinus, in which the tumor was removed, have been followed by fatal purulent meningitis.

Dr. Lippincott:—Apropos of the case of Dr. Knapp, I should like to report a recent failure in a similar case, a second operation on the same patient. Two years ago, I reported at a meeting of this society the result of trephining in a case of sclerosing mastoiditis. The patient had been suffering intense pain, which was about the only symptom for twelve months. This did not yield to alterative remedies or to tonics. The operation was performed with the drill in March two years ago. The relief was instantaneous. She remained well for thirteen months, when the pain returned and has continued for twelve months more. The former routine was gone through with,

more particularly as some objection had been made to the operation when the case was reported. Last March, the patient insisting on a second operation, it was performed. Thinking that perhaps the reason for the want of permanency of the cure after the first operation was because I had used the drill and had not made a sufficiently large opening (the drill was 3-16ths), I used the chisel and drill combined in the second operation. The bone was so dense that there was difficulty in chiseling it without a good deal of hammering. I made a very extensive opening on the surface and went down three fourths of an inch before reaching the antrum. In opening the antrum, I used the drill. The bone was very vascular, but there was no pus. I treated the wound precisely as in the previous operation, using carbolized oil tents and poultices. There was no relief from the pain and the patient is clamorous for another operation. While the results of mastoid perforation in sclerosing inflammation have been remarkably good, it is of course desirable that the reverse side of the picture, as exhibited in Dr. Knapp's case and my own, should receive due attention.

Dr. Knapp:—The former cases of chiseling upon the sclerosed mastoid, which I have reported, have remained well, and have had no relapses. They were examples of sclerosing or condensing osteitis.

VERBAL COMMUNICATIONS

ON THE USE OF ADHESIVE RUBBER PLASTER IN CASES OF PERFORATION OF THE MEMBRANA TYMPANI.

By Dr. J. S. Prout, *Brooklyn, N. Y.*

Dr. Prout:—I would like to ask if any of the members have used the device suggested by Dr. C. W. Tangeman, of Cincinnati, of putting a piece of rubber adhesive plaster on the drum-membrane where there is perforation. It can be applied with ease and often closes the opening thoroughly. It is only indicated when all discharge has ceased. Some patients think that they have been benefited, and I am inclined to think that it is a decidedly useful procedure. By means of a piece of fine silk passed through the cloth on which the plaster is spread, it can be readily manipulated and placed in position on the drum-membrane. It may be removed by moistening it and drawing on the thread, or pulled off by means of a fine hook at the end of a wire or probe.

Dr. Theobald:—I tried that several years ago, but I cannot say that I accomplished anything by it. At the same time I tried Dr. Blake's discs of paper. After a time the plaster passes off of the membrane on to the wall of the canal, becomes loosened and may be removed. In one instance I succeeded in closing an old perforation by having the patient wear for some time an artificial drum composed simply of a pledget of cotton, moistened in glycerine and water.

Dr. E. E. Holt, of Portland, Me.:—Some five years ago, I used plaster, but I thought it increased the trouble. I have used the common paper discs as Dr. Blake suggests and they seemed to act better than the plaster.

THE USE OF APPARATUS FOR RAREFYING AND CONDENSING THE AIR IN THE EXTERNAL MEATUS.

By Dr. Samuel Theobald, *Baltimore, Md.*

Dr. Theobald:—Have any of the members had favorable results from the use of any form of apparatus for rarefying and condensing the air in the auditory canal, with the idea that the drum-membrane would be moved in and out and thus rigidity of the ossicles be lessened? I have attempted to do this by taking the ordinary hard rubber eartip of the otoscope and having attached to it the small rubber bulb found on medicine droppers. This seems to make an instrument well adapted to the purpose and there is no likelihood of any damage being done with it. I gave two of my patients such a device and told them how to use it. A little hyperæmia was produced wherever it was used, but there were no ill-effects. I could not, however, see that any benefit resulted.

I saw a statement in a recent medical journal that some one had accomplished a good deal by producing rarefaction and condensation of the air in the ear by simply pressing upon the tragus. Theoretically, it seems a rational procedure.

Dr. S. B. St. John, of Hartford:—This subject was brought up some three years ago, when I made some remarks on passive motion as applied to the joints of the ossicles produced by moving the drum by fixing a little syringe to Siegel's otoscope. I have used this procedure almost weekly since then. I am satisfied that in a certain proportion of cases I obtain a decided effect in the way of loosening the rigidity resulting from long standing chronic disease.

In this connection, I should like to call attention to a matter on which I have been experimenting, that is, in the

relief of certain forms of tinnitus by drawing out the drum-head and restoring it to more nearly its normal position. In many of these cases, the relief can be made more or less permanent, by drawing out the drum and fixing it in its new position by collodion. In one case, it has remained in this position for several months.

Dr. Pomeroy:—It is impossible to give all the elements which enter into the production of tinnitus. It is true that if the drum-membrane is sunken and the ossicles are pushed inward, the indication is to draw them out. My impression is that there is another element. The speaker has hinted at it in referring to the action of collodion on the drum-membrane. We know of some cases where as the result of a chronic inflammation, the drum-membrane being sunken, the hearing will be temporarily improved and the tinnitus diminished or relieved by inflation of the drum cavity, but the moment the patient attempts deglutition, the membrane falls back and the deafness and tinnitus return. The condition of the joints of the ossicles has not entered into my estimate of the subject. My mind has rather been occupied with the fact that the superficial area of the drum-membrane has been increased. The membrane has been pushed in so long that it has become stretched.

Some years ago, I did paracentesis of the drum-membrane with the view of improving hearing and diminishing tinnitus. I used the explanation, which I believe I got from Gruber, that the cicatrization of these punctures produced contraction and diminished the superficial area of the drum-membrane. Since that time I have continued the practice, making a considerable number of punctures at a sitting instead of a single one. I have not gotten through with my observations, but when I have accumulated sufficient material I shall report my results.

Dr. Sexton:—In reply to Dr. Theobald's inquiry, I

might mention that some ten years ago I learned that Dr. Pinkney in cases where the drum-membrane was sunken used Siegel's otoscope attached to a stomach pump, in this way making decided traction on the drum-membrane. In some cases, he thought he did some good. It occurred to me that a more moderate method of producing rarefaction might be of service, and that in certain cases alternate rarefaction and condensation were indicated, giving exercise, so to speak, to the transmitting mechanism. Mr. Stohlman, of George Tieman & Co., made an instrument for me for this purpose, which has been very satisfactory in the few cases in which such treatment is applicable. It consists of a rubber ball two inches in diameter connected with an olive shaped hard rubber earpiece (which can be fitted to the external meatus) by a piece of rubber tubing about ten inches long. I tried this instrument in a large number of cases, and think it proved beneficial in breaking down old adhesions interfering with the movements of the transmitting mechanism in some instances. I have also employed it with satisfaction during the later stages of acute and sub-acute inflammation, sometimes in connection with Politzer's method of inflation. Subseqently Dr. Woakes of London devised an instrument to suddenly rarefy the air in the external auditory canal; like Dr. Pinkney's device, however, it seems too violent for most cases.

Happening to mention this treatment to the late Dr. Willard Parker, he informed me that such methods had long been in vogue, and going to a drawer brought forth an apparatus, consisting in a large glass ball to fit over the entire auricle, to which a little pump was attached and it was intended to accomplish the same purpose of the other rarefaction instruments I have mentioned. It was the device of a charlatan well known fifty years ago.

ALPHABETICAL INDEX

OF

OTOLOGICAL LITERATURE, FROM JULY, 1885, TO JULY, 1886,

COMPILED BY

GORHAM BACON, M. D., New York, N. Y.

AND

FRANCIS H. BROWN. M. D., Boston, Mass.

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